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DISEASES CAUSED BY BACTERIA AND FUNGI.

RAMSAY, R. J., & TRACY, P. H. (1931). **Food Poisoning probably caused by Orange Colored Staphylococcus from Udders of apparently Healthy Cows.**—*Proc. Soc. Exp. Biol. New York.* **28.** 390-391. [4 refs.]

While investigating the origin of a malt flavour in milk the authors took repeated doses of milk which had been inoculated with a toxin-producing orange staphylococcus that had been found to give rise to the flavour. They developed severe gastro-enteritis and four kittens fed a similar diet all showed the same symptoms.

R. S. ROBERTS.

MENCK, F. (1932). Zur Serodiagnose der Tuberkulose des Rindes. [**On the Sero-Diagnosis of Bovine Tuberculosis**].—*Tierärztl. Rdsch.* **38.** 35-38. [29 refs.]

The author employed the complement fixation test, using tuberculin as the antigen, in the examination of sera from 432 tuberculous and 341 healthy cattle. The technique is described in detail and the author stresses the importance of observing it strictly.

His serological reactions were compared with *post-mortem* examinations and the errors were insignificant. He considers that the test as described yields a group reaction common to all species of the acid-fast group and that it is not specific only for *Mycobact. tuberculosis.*

J. E.

SCHORNAGEL, H. (1931). De onderzoekingen van Nieberle over tuberculose. [**Nieberle's Investigations regarding Tuberculosis**].—*Tijdschr. Diergeneesk.* **58.** 1145-1163 and 1216-1225.

This paper was read at a meeting of Directors of Municipal Slaughterhouses in Holland at Utrecht in June, 1931.

There is now very general agreement that the reaction of the body to a primary infection with tubercle bacilli differs from the reaction resulting from reinfection.

There is a close relationship between the anatomical form and the course of the infection on the one hand and the allergic condition of the body on the other.

It has not been found possible to distinguish between the condition of the body resulting from generalization of primary infection and chronic infection.

In the first case there is natural hypersensibility and in the second there is a condition of acquired immunity. There may, however, be hypersensibility in chronic tuberculosis and a relative amount of resistance in generalization.

To some extent these conditions are parallel in bovines and in man, but as a rule the reactions in the bovine are less pronounced or distinct than they are in the human subject. It is suggested that the bovine type of bacillus is less toxic for bovines than the human type is for man. A lower antigenic power in the case of the bovine type of bacillus results in a smaller production of antibody and in consequence the condition of allergy is less marked.

It is possibly because of this that in the bovine it is less easy to demonstrate a close relationship between the anatomical form of the disease and the allergic condition.

A. LESLIE SHEATHER.

SUNDBERG, R. (1931). Några undersökningar rörande blodprovets och tuberkulinundersökningens inbördes värden för ställande av diagnosen tuberkulos hos höns. [**Some Investigations respecting the Comparative Values of the Blood Test and Tuberculin Test in the Diagnosis of Tuberculosis in Hens**].—*Skand. Vet.-tidskr.* **21.** 109-118. 2 figs., 1 table. [Summary in English : abst. from orig.]

The author has diagnosed tuberculosis in hens partly by the complement fixation test and partly by the cutaneous tuberculin test made in one wattle. The complement fixation test is preferable as it is rather more reliable than the tuberculin test. In addition, the veterinary surgeon only has to make one visit to the poultry-yard for the blood test, whereas two visits are necessary for the tuberculin test.

N. LAGERLÖF (STOCKHOLM).

I. BOQUET, A. (1932). Surinfection tuberculeuse du Cobaye par voie sous-cutanée. [**Tuberculous Superinfection of the Guinea Pig by the Subcutaneous Route**].—*C. R. Soc. Biol. Paris.* **109.** 363-366. [4 refs.]

II. SAENZ, A. (1932). Sur l'infection tuberculeuse spontanée du Lapin et du Cobaye. [**Spontaneous Tuberculosis of the Rabbit and Guinea Pig**].—*Ibid.* 437-439. [3 refs.]

I. The increased local reaction occasioned by superinfection with the tubercle bacillus and known as Koch's phenomenon is considered to be due to a local hypersensitivity and a blocking of the bacteria with their subsequent destruction. The author cannot subscribe to this view and inoculates guinea pigs in one hind foot and subsequently in the other hind foot. His results suggest that the local reaction which is produced by the test bacteria diminishes parallel with the immunity engendered by the first injection, and that this immunity is produced by the presence of the bacteria in the lymphatic glands. Although the immunity produced restricts the fields of operations of the test organisms it is not sufficient to destroy or eliminate them from the lymphatic glands into which they penetrate.

II. The attention of laboratory workers is drawn to a spontaneous case of

tuberculosis in a laboratory rabbit which had had an intracerebral inoculation of charcoal. The causal organism was proved to be of the human type.

A case of spontaneous tuberculosis in a laboratory guinea pig is also described and it is thought that infection was probably *via* the eye or pharynx. The virus was thought in this case to be of the human type.

R. LOVELL.

ANDERSON, R. J. (1932). **The Chemistry of the Lipoids of Tubercle Bacilli.**—*Physiol. Rev.* **12.** 166-189. 6 tables. [68 refs.]

A review article from the Chemistry Department of Yale University by an author responsible for 24 out of the 68 original papers listed in the bibliography.

The work reviewed represents an attempt to separate the lipoidal substances present in tubercle bacilli and in a series of related pathogenic and non-pathogenic acid-fast bacteria, by systematic fractioning into special groups.

It is now generally recognized that from 20 to 40 per cent. of the dried cells of the tubercle bacillus represents lipoidal substances [i.e. fat-like components soluble in organic solvents such as alcohol, acetone, chloroform, ether] and that the acid-fast character and many of the biological reactions of the organism depend on these—for instance the " maturation factors " for monocytes, epitheloid cells and giant cells resulting in the formation of tuberculous tissues, which have been recently traced to certain new and peculiar optically active fatty acids of high molecular weight.

The methods of procedure for the cultivation and collection of bacterial masses, and for the extraction and purification of the lipoidal components are given, and Table I gives a summary of the fractions obtained from five acid-fast bacteria—human, avian and bovine tubercle bacilli, the timothy bacillus, and *M. leprae* (as obtained from the Mulford Co. of Philadelphia).

Table II gives the composition of the impure bacterial phosphatides in respect of phosphorus, nitrogen, ether-soluble and water-soluble portions ; Table III gives their cleavage products in respect of fatty acids, carbohydrates and glycerophosphoric acid, and Table IV the constants of the acetone-soluble fats. Table V gives the percentage composition of these latter fats and shows the fatty acids contained in them—butyric, palmitic, stearic, cerotic, linoleic, linolenic, tuberculostearic and phthioic acids.

The main points of interest may be summarized as follows :—

(1) Chemical composition and biological reactions indicate that bacillary lipoidal components occupy a unique position differing decidedly from the usual plant and animal lipins.

(2) The acid-fast bacteria elaborate a new series of optically active higher fatty acids, of which phthioic acid possesses specific biological properties remaining after numerous fractionings of the methyl ester in high vacuum. Several hexacosanic acids (isomers of $C_{26}H_{52}O_2$), both saturated and unsaturated, are present.

(3) The fatty fraction soluble in cold acetone represents a mixture of free fatty acids and neutral fat the latter, however, being an ester of fatty acids with some unidentified higher polyhydric alcohol and not with glycerol.

(4) The phosphatides and the so-called " purified wax " contain large amounts of polysaccharides differing both in chemical composition and in biological reactions. The polysaccharide in the phosphatide gives no precipitin reaction with immune serum and on hydrolysis yields inosite, mannose and some other sugar not yet identified, whereas the polysaccharide from the wax gives a precipitin reaction and yields d-arabinose, mannose and galactose together with some other

unidentified sugars. This latter polysaccharide is unique and not only yields over 35 per cent. of d-arabinose, a pentose rarely found in nature, but is so extraordinarily stable that it still showed a specific reaction with immune serum in dilutions of one in three million after isolation from wax refluxed for 8 hours with 10 per cent. alcoholic potassium hydroxide.

(5) The principal constituent of the wax fraction is a very stable snow-white amorphous substance possessing the properties of a higher hydroxy acid, and is acid-fast.

(6) The lipoid fractions apparently contain no sterols.

H. H. GREEN.

SABIN, F. R. (1932). **Cellular Reactions to Fractions isolated from Tubercle Bacilli.**—*Physiol. Rev.* **12.** 141-165. [99 refs.]

This review article by Sabin of the Rockefeller Institute, New York, should be read in conjunction with the paper by ANDERSON [abstracted above] with whose lipoidal fractions the author finally deals.

The paper provides a valuable discussion of the literature on biological reactions of substances isolated from certain acid-fast organisms notably from tubercle bacilli which in the dead state are capable of producing most of the cellular reactions of tuberculosis.

The general conclusions may be abstracted as follows :—

(1) Three different types of lipoidal complex can be discriminated by the cellular reactions they produce—a phosphatide, a wax-like alcohol, and an acetone-soluble fat.

(2) The tuberculo-phosphatide reproduces the tubercle. It is phagocytozed and partly degraded by the monocytes of the connective tissues, thereby forming the epithelioid cell. The constituent producing this reaction is phthioic acid, a saturated fatty acid of empirical formula $C_{26}H_{52}O_2$.

(3) The wax fraction also contains phthioic acid together with an unsaponifiable higher alcohol [or hydroxy acid—see ANDERSON above] of probable empirical formula $C_{94}H_{188}O_4$, which is responsible for the acid-fastness. This is apparently not phagocytozed but when injected in an oily carrier acts as a remarkable stimulant towards the production of undifferentiated connective tissue cells.

(4) The interest of the acetone-soluble fatty acid complex, is that it produces extremely varied cellular reactions and may be more like the lipoidal components of other strains of organisms.

(5) The characteristic cellular response to tuberculo-protein is the production of plasma cells. The tuberculo-polysaccharides are chemotactic and toxic to neutrophilic leucocytes.

H. H. GREEN.

I. FAVILLI, G. (1931). Untersuchungen über der Fähigkeit der Bakterien der Brucella melitensis-Gruppe, H_2S zu produzieren. Die Produktion von H_2S als Kriterium für die Differenzierung der verschiedenen Varietäten der Brucella-Gruppe. [**Studies on the Capacity of Bacteria of the Brucella Group to produce Hydrogen Sulphide. The Production of Hydrogen Sulphide as a Criterion for the Differentiation of the Various Varieties of Brucella**].—*Zlb. Bakt. I. (Orig.).* **120.** 24-34. 4 tables. [23 refs.]

II. ZØBELL, C. E., & MEYER, K. (1931). **Reduction of Nitrates and Nitrites**

by Representatives of the Brucella Group.—*Proc. Soc. Exp. Biol. New York.* **29.** 116-118. [5 refs.]

III. ZØBELL, C. E., & ZØBELL, Margaret H. (1932). **Metabolism Studies on the Brucella Group. III. Viability in Aqueous Solutions.**—*J. Infect. Dis.* **50.** 538-541. [8 refs.]

I. The author has studied the production of hydrogen sulphide by 108 strains of brucella which have been isolated from cows, swine, sheep, goats and human beings infected from bovine, porcine, ovine or caprine sources. Variations occurred and the production over 24, 48 and 72 hours was studied by the blackening of lead acetate papers inserted in the culture tubes. He found that bovine and porcine strains produced a large amount of hydrogen sulphide, those of caprine origin (*Br. melitensis*) produced either none or only a limited amount, whilst those from human beings infected from bovine or porcine origin behaved as bovine or porcine strains.

II. The authors state that semi-solid media favour the growth of brucella and accentuate the zone phenomenon. The *abortus* type is stated to find optimum conditions in the deepest zone, the porcine type in that nearest the top and the *melitensis* type in the intermediate zone. Upon addition of 0·2 per cent. potassium nitrate to the medium a reversal of positions is stated to be observed. The porcine type grows throughout the medium as a " pseudo-anaerobic " growth ; the bovine type does so to a less extent whilst the growth zone of *Br. melitensis* is confined to a few millimetres below the surface. It is assumed that the two forms may obtain their oxygen requirements from the disintegration of nitrates. Under these conditions all of the 425 brucella strains tested reduced nitrates and gas was formed. There is very little tendency for nitrites to accumulate because they are simultaneously reduced. In media containing 0·2 per cent. of potassium iodide in addition to 0·2 per cent. of potassium nitrate abundant gas is produced by the porcine type whilst it appears as if the other two types are sensitive to such media.

III. Experiments were undertaken to find a suspending fluid to preserve the viability of suspended bacteria over several days. A balanced cystine salt solution having the following composition was prepared :—dipotassium hydrogen phosphate 1 g. ; cystine 0·2 g. ; distilled water 1,000 c.c. ; sodium chloride 2·5 g. ; potassium dihydrogen phosphate 0·75 g. ; crystalline magnesium sulphate 0·1 g. and crystalline calcium chloride 0·01 g.

The reaction is buffered at pH 7·2 and in this solution brucella in dilute suspensions remain viable for from four to five weeks at room temperature. No perceptible multiplication takes place at from 18° to 20° C., but a slow increase is noted at 37° C. No clumping occurs.

R. LOVELL.

PANDIT, S. R., & WILSON, G. S. (1932). **The Relation between Specific and Non-Specific Agglutination in the Brucella Group.**—*J. Hyg. Cambridge.* **32.** 45-54. 7 tables. [19 refs.]

The authors record the results of a preliminary examination by specific and non-specific agglutination tests (specific serum agglutination tests, thermo-agglutination, salt-agglutination and acid-agglutination) of 117 strains of brucella obtained from various parts of the world. It was found that, with a few exceptions, porcine and bovine *abortus* strains were not thermo-agglutinable, whereas nearly half of the *melitensis* strains and all but one of the *paramelitensis* strains reacted positively to the thermo-agglutination test. There was a general correlation

observed between the thermo-agglutination test and the acid agglutination test. None of the porcine or bovine strains were agglutinated by salt (1 to 5 per cent.) at 55° C. whereas six *melitensis* strains and three *paramelitensis* strains showed some degree of agglutination.

They confirmed the observation of HADLEY that the normal type of *melitensis* represents the smooth form and that the *paramelitensis* type is mainly the rough form. It was shown that smooth types of bovine and porcine strains and *Br. melitensis* could be transformed to rough types by serial cultivation in heart extract broth and there appeared to be some evidence that *melitensis* strains are rather less stable than *abortus* strains.

It was observed that in general a strain which was highly thermo-agglutinable was frequently agglutinated by salt and by acid and reacted to a *paramelitensis* serum, but not to an *abortus* serum.

T. M. DOYLE.

THOMSEN, A. (1931). Om den smitsomme Kalvekastnings Bekaempelse ved Hjaelp af Blodpröver. [**The Control of Bovine** *Brucella abortus* **Infection by Means of Blood Tests**].—*Svensk Vet.-tidskr.* **36.** 183-197.

The author gives an account of the different methods at our disposal for the control of *Br. abortus* infection in cattle by means of blood agglutination tests. He submits the " Pennsylvania method " (U.S.A.) for the eradication of the disease to a critical examination and does not consider that it would be suitable for use in Denmark. This is caused by first, the method being too detailed and too expensive for the farmers, secondly, by the fact that in some instances infected animals do not react for a long time after they acquire the infection and, thirdly, by insufficient knowledge of the ways in which infection is acquired.

According to the author, the blood agglutination tests are of less value in controlling the disease than is the tuberculin test in the eradication of tuberculosis.

N. LAGERLÖF (STOCKHOLM).

HENRY, B., TRAUM, J., & HARING, C. (1932). **Methods for the Isolation of** *Br. abortus*.—*Hilgardia, California.* **6.** 355-379. 7 figs., 4 tables. [21 refs.]

This is a description of the routine technique employed by the authors, with, in addition, some experimental data collected in the course of their investigations on *Br. abortus* infection.

They use " chocolate " or cooked blood agar [FLEMING, A. (1919). *Lancet.* **196.** 138.] for primary isolation as they find this medium is superior to others in the uniformity of the results obtained.

" For the isolation of *Brucella abortus* from material such as milk, which contains other organisms, 0·1 c.c. of a saturated alcoholic solution of gentian violet is added to every litre of medium, making a final dilution of the dye approximately 1 to 208,000."

In comparative tests carried out to ascertain the relative value of guinea pig inoculation as compared with cultural methods for the isolation of *Br. abortus* from milk, guinea pig inoculation was found to be much more accurate. When cultural methods alone are depended upon the authors believe that failure results in from 25 to 30 per cent. of cases.

They prefer male guinea pigs to females for inoculation because of the characteristic lesions produced by *Br. abortus* in the testicles and because males appear to be more susceptible to infection with a small number of organisms.

The authors examined by guinea pig inoculation and by culture the urine of 13 cows, strongly positive to the blood agglutination test, for the presence of *Br. abortus* but obtained negative results in every case.

They consider that the optimum time for the autopsy of guinea pigs is from 40 to 44 days after inoculation, as at this period the correlation of agglutinins, macroscopic lesions and cultures is very close.

It was found that when the culture was made six weeks after inoculation, *Br. abortus* could usually be isolated from the spleens of guinea pigs showing an agglutination titre of 1 : 25 or higher.

This leaflet contains many " tips " in technique which should prove useful to those engaged in investigating this disease.

T. M. DOYLE.

I. KITSELMAN, C. H. (1932). **Bang's Disease (Contagious Abortion) in Cattle, including Treatment and Control, and its Relation to Undulant Fever in Man.**—*J. Amer. Vet. Med. Ass.* **80.** 828-838. 3 tables. [36 refs.]

II. ——. (1931). **Abortion produced in Cows with Brucella melitensis.**—*North Amer. Vet.* **12.** No. 9. 31.

I. This paper was presented at the annual meeting of the American Veterinary Medical Association in 1931. It contains a brief survey of some of the principal facts in connection with bovine contagious abortion.

II. ZANZUCCHI produced abortion in four cows in the fourth to sixth month of gestation by the intravenous inoculation of cultures of *Br. melitensis*. In each instance the abortion occurred between the 52nd and 88th day after inoculation and the organism was recovered from the foetus.

T. M. DOYLE.

I. LIVIERATO, A. (1932). La brucellose en Grèce. **[Brucella Infection in Greece].**—*Presse méd.* Feb. 6th. 198-200.

II. ALESSANDRI, H., & GONZALES, P. (1932). Infection humaine autochtone à *Brucella* au Chili. **[Human Infection with Brucella in Chili].**—*C. R. Soc. Biol. Paris.* **110.** 628-629.

I. The author gives an historical survey of brucella infection in Greece from the time of Hippocrates, who appeared to have recognized the malady now known as Malta, Mediterranean or undulant fever. Human infection is stated to be endemic and the classical type of clinical picture is the common one, although details of atypical cases are given. The goats of Greece are chiefly of two varieties, those indigenous to the country amongst whom brucella infection is stated to be slight, and those imported chiefly from Malta amongst whom infection is stated to be greater. By the milk agglutination test 7·08 per cent. are shown to be affected. On the other hand it is estimated that, since 1927, up to 40 per cent. of cattle are infected with *Br. abortus*.

Infection of human beings is chiefly by fresh milk, cheese and yoghourt. The notification of infection in goats and the habit of boiling milk are stated to account for the comparatively small number of human cases. The chief method of infection is with unboiled milk or its products, although in country districts the actual contamination of man by animals may account for some cases.

II. A human case of infection with brucella is recorded from Chili. Isolation of the organism by blood culture was accomplished. The patient had not been

in contact with bovines for some months previous to his illness, but had attended and drunk milk from a herd of goats in which abortion had occurred. Reference is also made to a laboratory infection and to the infection of a veterinary surgeon who had charge of a herd of bovines in which abortion occurred. No bacteriological examinations of goats or bovines have yet been made, but it appears likely that brucella infection of bovines and goats exists in Chili.

R. LOVELL.

HÜLPHERS, G. (1932). Några ord om köttförgiftningar och andra födoämnesförgiftningar. [**A Few Words concerning Meat and Other Food Poisonings**]. —*Skand. Vet.-tidskr.* **22.** 77-87. [Summary in English : abst. from orig.]

The author summarizes our present knowledge of illness in man following the ingestion of meat, fish and shell fish caused by one or other of the following :— *Clostridium botulinum*, paratyphoid organisms, *Bact. coli*, *Proteus vulgaris* and the anaerobic putrefactive bacilli. In each case the source and type of infection, the resultant changes in the characters of the food material, the symptoms induced in man and the methods of prevention of infection are analysed.

G. B. BROOK.

I. FILMER, J. F. (1930). **Lumpy or Matted Wool, or Mycotic Dermatitis in Sheep.**—*J. Dept. Agric. Western Australia.* **4.** 571-572.

II. WATERS, R. (1932). **Pink-rot of Wool.**—*New Zealand J. Agric.* **44.** 35-38. 1 fig.

I. The terms " lumpy " or " matted " wool refer to a mycotic dermatitis, the exudate from which results in the formation of hard cores in the wool. Local treatment with a 0·2 per cent. solution of copper sulphate has been suggested, as this has been found to sterilize the causal fungus.

[The author's detailed description of the clinical aspects of the disease forcibly brings to mind the condition known amongst British farmers as " rain rot "].

II. Pink-rot of wool is characterized by a discolouration of the wool and a " contraction or flattening of the wool locks in bands at affected layers, as if by some foreign substance." A bacterium, which closely resembles *B. vulgatus*, has been isolated from affected wool and its characters are recorded in detail. When incubated with wool at 30° C., this organism invariably produces a change in the wool indentical with that seen in the natural disease. It is suggested that the organism is normally present in the fleece and that occasionally it encounters optimum conditions for its growth, namely, when water has penetrated to the deeper layers of the wool where the temperature admits of multiplication. Growth of the wool brings the affected areas nearer the surface, but never to the tip of the fibres.

R. S. ROBERTS.

DISEASES CAUSED BY PROTOZOAN PARASITES.

VAN DEN BRANDEN, F. (1931). Essais de Traitement de la Trypanosomiase humaine par une méthode biologique. [**Attempts to treat Human Trypanosomiasis by a Biological Method**].—*Ann. Soc. belge Méd. trop.* **11.** 395-397.

ARNAUD has recommended the following treatment for sleeping sickness; it is applicable to persons who are in good condition but in whose blood trypanosomes are present. The serum is incubated for 20 hours at 37° C.; to 60 c.c. of such serum is added 40 c.c. of the mixture :—formol 0·5 c.c., phosphoric acid 0·5 c.c. and normal saline 39 c.c. This mixture is allowed to stand for eight hours. 2 c.c. are then added to 8 c.c. of venous blood and this is injected in four doses at intervals of three days.

The author has tried this treatment on nine cases, but has failed to get even brief sterilization.

A. LESLIE SHEATHER.

HOARE, C. A. (1931). **Studies on *Trypanosoma grayi*. III. Life-cycle in the Tsetse-Fly and in the Crocodile.**—*Parasitology*. **23.** 449-484. 4 plates. [43 refs.]

In a previous paper [(1930). *Parasitology*. **22.** 39.] Hoare has described the life history of *T. grayi* in *Glossina palpalis*. The infective forms are produced in the hind gut and transmission is effected by the contaminative method through the mouth of the crocodile. The crocodile suffers a mild infection, apparently with no harmful effects and no initial acute attack. In the absence of reinfection, infection will persist for two years and probably for life. Probably in nature the majority of crocodiles are infected. No developmental forms have been found in the tissues, but this is hardly to be expected in view of the small number of parasites present. The parasite in the crocodile is 68μ to 91μ long with a free flagellum. The undulating membrane is strongly developed and the surface of the body appears striated. The nucleus is near the posterior third.

If flies are fed on an infected animal and not starved more than five days, 61 per cent. are found infected. If starved or fed on sheep the rate is reduced to about 10 per cent., which approximates the percentage infection of wild flies.

A full account of the development in the tsetse is given and should be consulted in the original. For the preparation of smears from tsetse for staining, the author recommends fixing in the vapour of 1 per cent. osmic acid and then the addition of a drop of serum.

U. F. RICHARDSON.

MAYHEW, R. L. (1932). **Studies on Coccidiosis. I. The Effects of Coccidiosis upon the Weights of Chickens artificially inoculated during the Seventh Week. II. The Effects of Coccidiosis upon the Weights of Chickens artificially inoculated during the Thirteenth and Fourteenth Weeks.**—*Poultry Sci.* **11.** 34-39 and 102-105. 3 tables, 5 charts. [5 refs.]

Experimental coccidiosis has a marked effect in inhibiting the increase in weight of the affected chicks. The author's results showed, as would be expected, considerable individual variation, but the maximum effect appeared to occur about ten days after inoculation and persisted for at least ten weeks, in that the weight attained by healthy controls was never reached. The infection at 13 to 14 weeks appeared quite as severe in its effects as that at 7 weeks.

NORMAN HOLE.

I. COLLIER, W. A., WARSTADT, A., & KRAUSE, Magdalene. (1931). Ueber Heilversuche am Malariainfizierten Kanarienvogel mit einem neuen

Präparat. [**Experimental Treatment of Malaria in the Canary with a New Preparation**].—*Zschr. Hyg. u. Infektkr.* **112.** 527-533. 5 tables.

II. Boyd, G. H. (1931). **Host Feeding in its Relation to Parasite Reproduction in Avian Malaria.**—*J. Parasitol.* **18.** 115.

III. Huff, C. G. (1931). **Experimental Transmission of an Unusual Haemoproteus of Mourning Doves.**—*Ibid.* 122.
[Papers II and III were presented at the 7th Annual Meeting of the American Society of Parasitologists].

I. The authors record experiments to test the prophylactic and curative values of R118 and R123, two quinine products prepared at the chemical institute of the Berlin University, against *Proteosoma praecox* [*Plasmodium elongatum*] in canaries. As a curative, two doses of R118 freed the birds from parasites, but relapses occurred. As prophylactics, six doses on consecutive days prolonged the incubation period. The ratio of effective dose to toxic dose is 1 : 250 as against quinine 1 : 4 and plasmoquine 1 : 35.

II. This paper deals with effects of the feeding of the host on the periodicity of *P. cathemerium*. The author concludes that though feeding may have some influence on the periodicity it is not the only factor involved.

III. Huff reports the transmission of *Haemoproteus sacharovi*, a parasite of mourning doves, by *Pseudolynchia maura*.

U. F. RICHARDSON.

DISEASES CAUSED BY FILTRABLE VIRUSES.

I. Gunneman, F. (1931). Den perniciösa anämien i Pajala veterinärdistrikt. [**Pernicious Anaemia in the Veterinary District of Pajala**].—*Svensk Vet.-tidskr.* **36.** 310-316.

II. Lehnert, E., & Svensson, S. (1932). Hästblodets järnhalt särskilt med hänsyn till sjukdomen perniciös anämi. [**The Iron Percentage of Horse Blood, especially in Respect to Equine Infectious Anaemia**].—*Skand. Vet.-tidskr.* **22.** 21-25. 1 table. [1 ref.] [Summary in English : abst. from orig.]

I. The author gives a description of equine pernicious anaemia in Pajala the most northern veterinary district of Sweden. The disease seems to spread on the common pastures ; this is particularly evident if a sick horse grazes together with healthy ones. Probably many horses suffer from pernicious anaemia in a slight degree without showing clinical evidence of illness.

No methods of treatment have yielded success. The use of pastures by affected horses should be prohibited.

It is desirable that all horses which are slaughtered in those parts of the country where the disease flourishes be examined *post-mortem* by a veterinary surgeon in order that its real extent may be determined.

II. The great difficulty in some cases of making a correct diagnosis of pernicious anaemia led the authors to investigate the iron percentage of horse blood. In the present work the result of the examination of healthy horses is reported.

The average of the iron percentages of the blood as determined on 56 healthy army horses was 0·409 g. iron per 1,000 c.c. of blood corresponding to 122·8 g. of haemoglobin per 1,000 c.c. of blood. The maximum and minimum amounts were 0·571 g. and 0·317 g. iron corresponding to 171·3 g. and 95·1 g. of haemoglobin.

N. LAGERLÖF (STOCKHOLM).

Lubbehusen, R., & Ehlers, D. (1932). **Fowl-Pox Vaccination at Various Ages and its Effect upon Normal Growth Gains.**—*J. Amer. Vet. Med. Ass.* **80.** 236-249. 2 tables, 5 graphs. [7 refs.]

The authors carried out a series of observations on birds of various ages to study the effect of vaccination against fowl pox with unattenuated fowl pox virus applied either by the feather follicle method (application of the virus to a plucked area of skin) or by the " stick " method (application of the virus by needle points). The effects of the vaccination were judged by the growth gains of the vaccinated birds as compared with control groups.

Vaccination of birds between 30 and 90 days of age gave the best results, as during this period the systemic disturbance following vaccination did not affect normal growth and development. Vaccination between 90 and 120 days of age caused a temporary check to growth, while vaccination after 120 days of age caused a distinct post-vaccination shock which under certain conditions (intercurrent disease or parasitism) predisposed to impaired health.

T. M. DOYLE.

I. Craigie, J., & Tulloch, W. J. (1931). **Further Investigations on the Variola-Vaccinia Flocculation Reaction.**—*Med. Res. Council Spec. Rep. Ser.* No. 156. pp. 129. 17 figs. on 9 plates. 104 tables. London: H.M. Stationery Office.

II. Havens, L. C., & Mayfield, C. R. (1931). **Flocculation Experiments with Variola and Vaccinia Virus.**—*Amer. J. Publ. Health.* **21.** 329-343. 11 tables. [11 refs.]

I. In this publication, the authors have considerably extended their observations on the accuracy of the flocculation test in the detection of smallpox and vaccinia material. The specificity of the reaction has been confirmed by the examination of 129 specimens from different sources. Positive results were obtained with practically all the smallpox and vaccinia crusts, while varicella scabs and allied material gave negative reactions.

The rôle played by secondary invaders was fully investigated and previous conclusions were confirmed, *viz.*, that extracts of crusts removed the flocculating property from antivaccinia serum but failed to absorb the agglutinating antibodies from antistaphylococcal serum; in addition, suspensions of secondary invaders failed to remove the flocculating antibodies from antivaccinal serum. It was also found that flocculating sera could be obtained by means of bacteria-free material derived from rabbits affected with generalized vaccinia.

A series of experiments was undertaken on the relation of antigen to antibody and it was clearly shown that the most clear-cut reactions were obtained by keeping the concentration of the serum constant while that of the extract was varied. Other modifications of Gordon's method were tried but, in general, his original recommendations gave the most satisfactory results. It was noted, however, that a preliminary extraction of the crusts with ether tended to remove certain substances which occasionally obscured the flocculation reaction. It was also necessary to conduct the test in a menstruum near the neutral point since non-specific precipitation was liable to occur at certain degrees of acidity and alkalinity. Various means of purifying the extract were investigated and it was found that the flocculable substance was fairly intimately associated with the euglobulin fraction. In all experiments in which the flocculable substance was destroyed, infectivity had also disappeared.

The final part of the report deals with the production of passive and active

immunity. In seven consecutive experiments, an appreciable degree of passive immunity was conferred by flocculating antisera of high titre. In some instances protection was afforded against large doses of virus administered by different routes including intratesticular injection.

Virus sensitized by admixture with flocculating serum yielded a stable product provided that the contact of the two components was maintained for four hours at 37° C. Such mixtures were devoid of infectivity for the skin of the rabbit, but were capable of conferring a solid immunity when inoculated subcutaneously in comparatively small doses. It is pointed out, however, that this " sensitized virus," when injected intratesticularly, contained active virus and hence the product might possess no advantage over untreated vaccine.

II. Havens and Mayfield describe the production of antivaccinia flocculating sera in the rabbit and in the human subject. The antigens used for the immunization of rabbits and for the flocculation tests were composed of desiccated dermal virus or infective brain preserved in glycerine. The tests were conducted along the lines suggested by GORDON, but a temperature of 37° C. was substituted in place of the more usual 55° C. Experiments with antigens of varying strengths showed that with a given serum there was an optimum concentration of antigen around which flocculation was most marked. [These results are in accordance with the findings of Craigie and Tulloch].

The contention that concomitant bacteria might be responsible for the flocculation was examined. It is suggested that the reaction must be regarded as specific on account of the unequivocal flocculation with bacteria-free brain material ; moreover, the absorption from the sera of agglutinins for the bacteria found in the dermal virus did not affect their flocculating properties.

Contrary to the findings of GORDON and of BURGESS, CRAIGIE and TULLOCH, the test was disappointing in differentiating smallpox material from allied conditions, such as chickenpox. In 35 per cent. of the tests with chickenpox scabs, flocculation occurred with antivaccinia serum, but a similar phenomenon was noted with normal serum. It is suggested that the specificity of the reaction can be enhanced by the use of serial dilutions of the antigen.

R. E. GLOVER.

MOOSER, H., & CASTANEDA, M. R. (1932). **The Multiplication of the Virus of Mexican Typhus Fever in Fleas.**—*J. Exp. Med.* **55.** 307-323. 1 plate, 6 tables. [5 refs.]

Large numbers of *Rickettsia prowazeki* are demonstrable in the epithelial cells of the stomach and malpighian tubules of fleas fed on infected white rats. A number of species of fleas, found as natural parasites on wild rats, were tested and infection occurred in every individual case. The fact that the salivary glands were not infected, and that the parasites were not numerous in the lumen of the gut, may partly explain the small danger of fleas as vectors of typhus. The authors suggest that typhus was originally a disease of rodents that has been transmitted to man by fleas or possibly ticks.

NORMAN HOLE.

DISEASES CAUSED BY METAZOAN PARASITES.

HOEPPLI, R., & FENG, L. C. (1931). **Histological Reactions in the Skin due to Ectoparasites ; *Dermacentor sinicus* P. Schulze from Hedgehog, *Haemaphysalis campanulata hoeppliana* P. Schulze from Dog, *Cimex lectularius***

and *Pediculus vestimenti* from Man.—*Nat. Med. J. China.* **17.** 541-556. 8 figs. on 4 plates (1 coloured). [15 refs.]

The histological reactions in the skin of human beings and animals against certain ectoparasites are described. Serial sections were made of areas of skin from men, dogs, hedgehogs, guinea pigs and rabbits which had been either bitten by ticks (*D. sinicus, H. campanulata hoeppliana*) or injected with emulsions of the salivary glands of these parasites. Varying periods were allowed to elapse before the skin was excised.

It was found that, in the case of the dog's skin, the tick had penetrated the corium around which was a homogeneous eosinophilic zone. Below this point occurred a slight perivascular polymorphonuclear infiltration. Cells with eosinophilic granulations were not observed. Small haemorrhages were found under the epidermis. Similar changes were observed in the skin of the hedgehog except that eosinophiles were comparatively numerous in the cell infiltration. After the tick had withdrawn its mouth-part the homogeneous eosinophilic area was invaded by wandering cells within a few hours. The histological changes produced in the skin of the hamster and guinea pig by these ticks were identical with the changes found in the natural infestation of hedgehogs.

The subcutaneous injection of an emulsion of the salivary glands of *D. sinicus* into rabbits, guinea pigs and hamsters resulted in an infiltration with polymorphonuclear leucocytes and mobilized tissue cells, oedema and hyperaemia at the site of injection. Homogeneous eosinophilic areas were not observed. It was concluded that the skin changes were primarily due to the secretion of the glands which had obviously a penetrating and necrotic action.

The infiltrating cells shortly after the injection or bite were mostly polymorphonuclears ; later, the majority were mobilized " tissue cells " [histiocytes].

Negative results were obtained in the course of experiments on bites of the human skin with *C. lectularius* and with the intradermal injection of the salivary glands into rabbits and guinea pigs.

Similarly, negative results were obtained after bites by *P. vestimenti* in rabbits, guinea pigs and hamsters. The intradermal injection of one type of salivary gland of the lice into human beings caused reddening, swelling and papular formation of the skin and the patient became ill 9 to 14 days later. The clinical picture resembled an atypical type of trench fever.

J. R. M. INNES.

I. Lörincz, F., Burghoffer, G., & Bodrogi, G. (1932). Beitrag zur Echinokokkenkrankheit in Ungarn. [**Hydatid Disease in Hungary**].—*Zlb. Bakt. I. (Orig.).* **124.** 16-22. 3 tables.

II. Keller. (1931). Trichinen beim Fuchs. [**Trichinae in the Fox**].—*Zschr. Fleisch- u. Milchhyg.* **42.** 137. [4 refs.]

I. The authors have endeavoured to arrive at an idea of the prevalence of echinococcus in Hungary from the examination of dogs, from meat inspection records and from hospital records. Of 104 dogs examined in Budapest, three were found to be infected and, as the city contains 21,000 dogs, the proportion of those infected in the 104 which were examined indicates that some 8,000 are carriers of echinococcus.

Meat inspection returns at Budapest show 1·8 per cent. of sheep to be infected, 7·1 per cent. of cattle, 17·3 per cent. of pigs and 2·1 per cent. of horses.

Data collected from surgical clinics by Czirer in 1927 showed 0·2 per cent. echinococcus infection and statistics from four prosectoriums which are treated

in an analytical table by the authors show 42 cases of echinococcus infection out of 23,934.

It is concluded that hydatid disease is no worse in Hungary than in the bordering countries on the west.

II. Trichinae were found in the muscles of the neck, fore and hind limbs, tail, body and loin and were particularly numerous in the tongue, the diaphragm and the masseter muscles of an infected fox. The capsules were observed to be distinctly double contoured and to contain living trichinae ; they were of a particularly tough consistency and circular or oval in outline.

It has been noted by other authors that the capsules of trichinae cysts in the dog, badger, mouse and cat are also of this shape and that the citron-shaped cysts are apparently peculiar to the pig. This difference is probably determined by the structure of the muscle fibres.

E. L. TAYLOR.

STROH, G. (1932). Coenurus cerebralis bei der Gemse. [*Coenurus cerebralis* **in the Chamois**].—*Berl. tierärztl. Wschr.* **48.** 465-466. 5 figs.

The author gives an account of five personal observations of the occurrence of the larval stage of *Taenia coenurus* in the brain of the chamois, mentioning the symptoms shown and the position which the cysts were found to occupy. The ages of the chamois ranged between 14 months and four and a half years.

E. L. TAYLOR.

WHARTON, D. R. A. (1931). **Skin Reactions in Rabbits infected with the Larval Form of** *Taenia serrata*.—*Amer. J. Hyg.* **14.** 477-483. 2 tables. [5 refs.]

Of 182 laboratory rabbits, 81 (44 per cent.) were found to harbour the larval stage of *Taenia serrata*. The omentum was found to be the predilection seat and in that position the cysts appeared to do little harm, but some heavily infected experimental rabbits died as a result of massive invasion of the liver.

Thirty test rabbits received intradermal injections of 0·1 c.c. of an antigen prepared by extracting the dried powdered worm in water. Eighteen of these rabbits were infected and of these 15 gave positive and 3 gave negative reactions (two of these were very heavily infected). The remaining 12 rabbits were uninfected and gave uniformly negative results. Infected rabbits when tested with antigen made from *Moniezia*, *Macracanthorhynchus* and *Cysticercus fasciolaris* also gave negative results.

E. L. TAYLOR.

—. (1932). **Airplane used in Fluke Control.**—*J. Amer. Vet. Med. Ass.* **80.** 119-120.

At one time fascioliasis threatened to put an end to sheep farming in parts of California. Carbon tetrachloride proved very effective in the treatment of the disease and some 300,000 doses have been successfully used for this purpose. Practical difficulties were, however, encountered in the application of copper sulphate to certain large stretches of marsh land for the destruction of the intermediate host snails. These have now been surmounted by the use of aeroplanes to broadcast the powdered copper sulphate.

E. L. TAYLOR.

—. (1931). **Report of the Proceedings of the Helminthological Society of Washington.**—*J. Parasitol.* **17.** 230-236.

During the 131st, 132nd, 133rd and 134th meetings of this society the following interesting points were raised :—

G. Dikmans reported the finding of *Ascaridia numidae* in the guinea fowl in Louisiana.

E. W. Price presented a short note referring to his recent paper on the Schistosomidae in which it was proposed that the genus *Macrobilharzia* should be suppressed. The recent study of further material has convinced him that this genus should be revived and *Paraschistosomum* Price, 1929 be suppressed as a synonym. A definition is given of the genus *Macrobilharzia* Travassos, 1923 based on a study of the new material.

E. E. Wehr gave a note on *Desmidocercella numidica* which he found in the membrane lining the air sacs of a heron.

G. F. Otto presented a note on the passage of ascaris eggs through dogs, cats and chickens. He found that from 52·3 to 76·2 per cent. passed through dogs, 69 per cent. through a cat and from 16·5 to 40·5 per cent. through chickens : most of the eggs still remained viable and capable of developing normal larvae.

C. W. Rees reported the successful treatment of notoedric mange in rabbits with 5 per cent. phenol dissolved in paraffin oil diluted with an equal quantity of cotton seed oil and applied with a sprayer.

M. F. Jones presented a note on the loss of an experimental infestation of *Raillietina cesticellus*. After persisting for three months it was found at the end of approximately five months to have disappeared. This worker also presented a note on a ground beetle, *Amara* sp., as an intermediate host for this tapeworm.

Wetzel gave a short account of his observations on the morphological differences between the infective larvae of *Strongylus equinus*, *S. edentatus* and *S. vulgaris*.

He also reported the finding of *Amidostomum chevreuxi*, probably identical with *A. skrjabini*, in the gizzard of a mallard from Montana.

N. R. Stoll reported the experimental infection of a goat with *Haemonchus contortus* from the sheep (a correction of his note given at a previous meeting).

W. A. Hoffman reported the removal of *Syngamus laryngeus* from the pharynx of a human being.

E. M. Nighbert reported the successful application of the swine sanitation system (advised for ascaris control) in the control of the thornyheaded worm, *Macracanthorhynchus hirudinaceus*, a reduction in the incidence of the worm to 40 per cent. of the original infestation having been produced in a herd of pigs.

E. L. TAYLOR.

Morris, H. (1932). **A Study of Intestinal Parasites in Horses and Mules in Louisiana, with Special Reference to the Control of Colic.**—*J. Amer. Vet. Med. Ass.* **80.** 11-17. 1 fig., 1 chart. [3 refs.]

Systematic treatment for strongylosis in the horses and mules on the Louisiana Agricultural Experiment Station Farm considerably reduced the incidence of colic. Oil of chenopodium was found to give the best results ; carbon tetrachloride gave good results ; and 8 g. of antimony and potassium tartrate, in capsules, given for three consecutive days, also produced a satisfactory anthelmintic effect. During the four years' period of observation the weights of treated animals remained at about the same level, but the weights of three untreated controls showed a gradual decrease.

The animals used were collected from various localities at the beginning of the experiment, a number being purchased in the open market, and brought together for work on the new college grounds. At this time the incidence of colic was high but, as shown by the chart, it fell rapidly and remained much lower throughout the remaining three and a half years of the experiment. [This history appears to indicate that verminous infestation was not the cause of the colic. No data are given to show that the animals were heavily infested with worms and no mention is made of the way in which the satisfactory anthelmintic action of tartar emetic or of the other two drugs was ascertained].

E. L. TAYLOR.

I. ZAHN, F. (1931). Ergebnisse der Trichinenschau in Württemberg und Baden seit 1. Oktober 1927 und 1. April 1930 bis Juni 1931. [**The Results of Trichinosis Inspection in Wurtemberg and Baden from October 1927 and April 1930 to June 1931**].—*Zeitschr. Fleisch- u. Milchhyg.* **41.** 523-525. 2 tables.

II. JUNACK, M. (1931). Neue Wege zur Rinderfinnenbekämpfung. [**New Methods for the Control of Cysticercosis in Beef**].—*Deuts. Schlachthof Ztg.* **31.** 59-60.

I. Trichinosis returns from six towns in Wurtemberg for the 47 months from 1st October, 1927, to 31st May, 1931, show that out of 413,487 pigs inspected 15 were found infected. Three infected foxes and one infected cat were also found. Returns from five towns in Baden show that in the 14 months from 1st April, 1930, to 3rd June, 1931, seven infected pigs were found out of 99,220 examined. Details are given of the new restrictions in Wurtemberg which are to be extended to all flesh-eating animals which might possibly be used for human food such as the bear, badger, fox, dog and cat. The incidence of the disease has been greatly reduced since trichinosis inspection was instituted and, as the price of the meat is only raised by ½d. to ¾d. per pound, it is a satisfactory way of dealing with the problem.

II. During the past few years it has become increasingly evident that the system of meat inspection at present practised in Germany is not diminishing the incidence of cysticercosis in beef, a steady increase having been noticed during the years 1923-1928. Three reasons are mentioned in explanation :—(1) soldiers becoming infested with *Taenia saginata* in foreign countries during the war and bringing the infestation into Germany on their return ; (2) the better technique employed in meat inspection allowing fewer cases of light infestation to escape notice and so increasing the apparent incidence and (3) the 21 days' cooling which is required before the release of slightly infested carcasses is not sufficient to kill all the cysts.

If the regulations concerning the inspection for this parasite are strictly enforced and if freezing for from four to five days be substituted for 21 days' cooling, the incidence of the parasite would doubtless soon diminish.

E. L. TAYLOR.

BÄURLE. (1931). Trichinenfunde bei Schweinen. [**An Observation on Trichinae in Swine**].—*Münch. tierärztl. Wschr.* **82.** 640-642. 3 figs.

Some aberrant trichinous capsules in the muscles of a pig which was also infected with sarcocystis are here described. The centres of calcification were opaque, their borders not clearly defined, and the dead larvae which they contained

were not properly coiled, suggesting that the calcification had occurred quickly and before the larvae had gained their proper position. The experimental feeding of this meat to mice gave negative results.

The author points out, however, that the larvae are not always dead in these opaque capsules as he has seen a live one squeezed out during the trichinoscopic examination of flesh from another animal and obtained positive results by feeding the flesh to mice.

E. L. TAYLOR.

CAMERON, T. W. M. (1932). **The Lung Worms of Domesticated Animals.**—*Vet. Rec.* **12.** 775-781.

This paper gives an account in popular language of the lungworms of the horse, ox, sheep, pig, dog, cat and fowl and deals with nematodes of the genera *Echinococcus*, *Muellerius*, *Aelurostrongylus*, *Protostrongylus*, *Metastrongylus*, *Dictyocaulus* and *Syngamus*.

E. L. TAYLOR.

ONO, S. (1932). *Gymnopleurus* **sp. as the Intermediate Host of** *Spiruridae* **found in the Vicinity of Mukden, South Manchuria. II Report. Studies on the Life History of** *Arduenna strongylina*.—*J. Jap. Soc. Vet. Sci.* **11.** 105-117. [Summary in English : abst. from summary.]

This is the author's abstract of a paper which he published in Japanese.

The encysted larvae of *Arduenna strongylina* (a parasite of the pig's stomach) were found in two species of dung beetle of the genus *Gymnopleurus* and *Scarabaeus*, the dragon fly, *Anax parthenope*, a species of suslik of the genus *Citellus*, a hedgehog and a bat. When these larvae were given to rabbits they were found to develop in the stomach and to produce gastric ulcers. *Spirocerca* sp. and *Gongylonema* sp. developed in the aorta and the oesophagus of some of the rabbits and an unrecognized species of nematode was found encysted in the stomach wall. Mature specimens of *Arduenna strongylina* were successfully transferred from pigs to rabbits where they produced gastric ulcers, in three instances leading to penetration and death from peritonitis.

E. L. TAYLOR.

NAGOYA, T. (1931). **Fate of** *Anchylostoma caninum* **Larvae orally or percutaneously transmitted to the Proper Host, Dog fed on Vitamin Deficient Diet. (First Report). Experiment on Puppies Fed on Vitamin A Deficient Diet. (Second Report). Experiment on Puppies Fed on the Diet Deficient in Vitamin B.**—*Jap. J. Exp. Med.* **9.** 573-585 and 587-593. 8 tables. [25 refs.]

Pups up to six months old were fed on a diet deficient in vitamin A until symptoms of avitaminosis appeared and were then infected with *Ancylostoma caninum*, some through the mouth and some by skin penetration. Subsequent examination showed that more larvae developed to maturity in those animals which had been on the vitamin deficient diet than in the controls ; 74 per cent. of larvae which entered the host by skin penetration and 28 per cent. of those given by the mouth reached maturity in the vitamin starved pups, while in the controls the corresponding percentages were only 44 per cent. and 23 per cent.

It is concluded that the percutaneous route of infection is the more important one and that migration through the tissues is of great significance for the further development of the larvae. Many of those taken in by the mouth are passed out in faeces, but few, if any, which infect by skin penetration are lost in this way ; doubtless those larvae which enter the body through the mouth and afterwards pass through the lungs are similarly prepared for further growth in the bowel.

In the second series of experiments pups were fed on a diet deficient in vitamin B until symptoms of avitaminosis appeared when they were given doses of the infective larvae of *Ancylostoma caninum* either orally or percutaneously. As a result of the vitamin B starvation the pups were apparently even more susceptible than those which had been starved of vitamin A in the previously described experiments.

E. L. TAYLOR.

MOTAIS, F. (1931). Considérations sur la pathogénie de la sparganose oculaire. **[Notes on the Pathology of Ocular Sparganosis].**—*Bull. Soc. Path. exot.* **24.** 915-919.

Medical practitioners in Indochina have often remarked on the frequent occurrence of *Sparganum mansoni* in the periocular tissues of the inhabitants. The origin of this localization was not suspected until CASAUX in 1927 discovered that a patient had, a few days previously, applied freshly killed and opened frogs as a remedy for some form of conjunctivitis. EVANNO (1927) noted the same practice and obtained an experimental infection of a monkey by placing a sparganum in the conjunctival sac. The author here gives an account of four cases in natives which have come under his care all of which admitted to having practised this treatment. Between 8 and 15 days after applying the freshly opened frogs the irritation and oedema had made its appearance and symptoms of ocular sparganosis set in. It appears to be clear that this disgusting practice is the origin of the infestation and that the plerocercoid or the procercoid or both are capable of passing directly from the frog or from the contents of the frog's intestine to the eye. [It would be interesting to know if this treatment is also applied by the natives to animals. The sparganum would presumably transfer itself].

E. L. TAYLOR.

I. RODHAIN, J. (1931). Les filaires de l'Afrique tropicale ; rôle pathogène.—Les réactions allergiques qu'elles provoquent et le diagnostic de celles-ci. **[The Pathogenicity of the Filarias of Tropical Africa. The Allergic Reactions which they provoke and their Diagnosis].**—*Bull. Soc. Path. exot.* **24.** 882-897. [13 refs.]

II. RODHAIN, J., & DUBOIS, A. (1932). **A Contribution to the Study of Intradermal Reactions in Human Filariasis.**—*Trans. Roy. Soc. Trop. Med. Hyg. London.* **25.** 377-382. [4 refs.]

I. The author gives here a general discussion of filariasis caused by *Loa loa*, *Acanthocheilonema perstans* and by *Onchocerca volvulus*, comparing his own experiences of a few cases in Europeans with the published observations of other writers. The mature *A. perstans* is regarded as of doubtful pathogenicity. Rodhain holds the view that the oedematous swellings frequently associated with these infestations are allergic phenomena and that they vary with the susceptibility of the individual host. Trials of the intradermal inoculation of extracts of *Dirofilaria*

immitis for diagnosis confirmed the results of TALIAFERRO and FAIRLEY and added *A. perstans* to the list of filarias known to produce reactions. In the author's experience the complement fixation test is not reliable for *O. volvulus*.

II. In the second paper an account is given of the results which the two authors have obtained by the intradermal injection of *Dirofilaria immitis* antigen, using antigen supplied by FAIRLEY and following his technique. Trials were carried out on six cases of *Loa loa* infestation, three of *Onchocerca volvulus*, three of *Acanthocheilonema perstans* and on 15 persons free from filarial infestation.

All cases of *L. loa* and *A. perstans* infestation gave definite reactions, but the results obtained in the cases of *O. volvulus* were not so satisfactory. Of the 15 persons not free from filariasis only one gave a positive reaction, developing a weal of 2·7 cm. diameter at the site of inoculation. It is thought that this was possibly a result of the heavy infestation of ascaris and oxyuris which this subject had harboured when a child.

One of the negative reactors was infected with *Schistosoma haematobium*.

E. L. TAYLOR.

DISEASES, GENERAL.

KÜST & UHRIG. (1932). Klinische Beobachtungen über gehäuft auftretende Sterilität und seuchenhaft auftretendes Verkalben im Frühstadium der Trächtigkeit. [**Clinical Observations on Outbreaks of Sterility and on the Epizootic Occurrence of Abortion**].—*Tierärztl. Rdsch.* **38.** 85-88, 104-106 and 121-124.

The authors give in detail records of a number of cases from herds affected with sterility and abortion due to causes other than infection with *Br. abortus*. Several animals affected with acute infection of the genital passages were destroyed, but it was found that in practically all the other cases complete recovery occurred when simple treatment of the individual animals was combined with proper attention to the herd management and careful disinfection of the premises. Stress is laid on the part played by the bull in the spread of infection and on the importance of the examination and treatment of bulls and regulation of services in a herd during and after treatment.

A. C. FRASER.

DE CASTRO Y RAMIREZ, R. (1931). Profilaxis de las enfermedades del cerdo. [**The Prophylaxis of Diseases of Swine**].—*Rev. Zootec.* **18.** 225-234.

A review article dealing with prophylactic measures and immunization against swine fever, septicaemia haemorrhagica, infectious diarrhoea, tuberculosis and external and internal parasites.

R. S. ROBERTS.

HALLGREN, W., & ANDERSSON, A. (1932). Et fall av trigeminusförlämning hos häst med keratitis neuroparalytica, orsakad av sekundär trigeminuskancer, utgången från palpebra tertia. [**A Case of Trigeminus Paralysis in a Horse, accompanied by Keratitis Neuroparalytica caused by Secondary Trigeminus Cancer arising in the Palpaebra Tertia**].—*Skand. Vet.-tidskr.* **22.** 133-146. 2 figs. [25 refs.]

The authors describe a case of secondary nerve cancer in the trigeminal nerve accompanied by keratitis neuroparalytica. The primary tumour was of

the size of a hen's egg, an epidermoid carcinoma in the palpaebra tertia situated in the right periorbital tissue. From this site, the tumour had grown into the ophthalmic nerve and thence into the other two branches of the trigeminal nerve ; it had grown mainly in the peri- and endoneural lymphatic vessels and spaces.

The external symptoms of disease were purulent conjunctivitis and keratitis, succeeded within a year by a complete trigeminal paralysis on the right side, with atrophy of the masticatory muscles of the right side of the head, insensibility in the skin on the right side of the head, and insensibility of the right eye and of the mucous membrane of the right nostril.

N. LAGERLÖF (STOCKHOLM).

I. NEWSOM, I. E. (1930). **Diseases of Poultry.**—*Colorado Agric. Expt. Sta. Bull.* No. 372. 1-42. 17 text figs.

II. PATTERSON, F. D. (1931). **Some Turkey Health Problems.**—*Vet. Med.* **26.** 492-493.

I. The author considers deficiency diseases, infectious diseases and other common poultry ailments and indicates the prophylactic or curative steps which have been found to be of value. He considers vaccination to be of doubtful value in fowl cholera and of only moderate value in fowl typhoid. The agglutination blood test has proved superior to the pullorin test for *B. pullorum* infection, and Runnell's rapid slide method is recommended.

In severe tuberculosis infection slaughter of the whole flock is advised. Diphtheria, infectious bronchitis, turkey roup and fowl pox are all described separately, and the author reports that in coccidiosis the addition of 40 per cent. milk to the ration gives the best results.

II. A brief note on the successful rearing of turkeys and on the best means of avoiding such troubles as blackhead.

NORMAN HOLE.

ELTON, C. (1931). **The Study of Epidemic Diseases among Wild Animals.**—*J. Hyg. Cambridge.* **31.** 435-456. [88 refs.]

In an introduction the author states that one of his objects is to show the value and importance of widely co-ordinated studies in obtaining further advances in the subject. The article is then divided into two parts, the first of which deals with the occurrence of disease among wild animals and the second with the forecasting of epidemics among wild rodents. Then follows a summary and references and an appendix consisting of certain unpublished data on animal epidemics.

The author is of opinion that one of the chief reasons why so little attention has been paid in the past to the pathology of wild animals is the general and widespread belief of biologists that the numbers of wild animals remain constant, whereas in fact they fluctuate more or less violently from year to year. It is further stated that the widespread existence of a number of unstudied epidemic diseases in wild species with which man and his domestic animals are daily in contact offers a possibility of tracing some of the epidemic diseases of man and domestic animals to a source in wild species.

In considering the distribution of disease among animals, it is stated that, in so far as invertebrates such as insects are concerned, climate and factors other than disease " appear to play the chief part in producing sudden fluctuations in the population." In regard to vertebrates, natural epidemics have frequently been noted amongst freshwater fish, game birds, rooks, etc.

Among wild animals, the cases of lemmings and mice are quoted, and the mouse plague of Nova Scotia in 1815 is referred to in some detail. Epidemics in other species, such as the Canadian snowshoe rabbit, are also noted. An interesting table dealing with the fluctuations in numbers of wild animals associated with outbreaks of disease concludes the first part of the article.

The author states that the remarkable fluctuations in the population which usually accompany epidemics in certain wild animals, make the building up of a forecasting system quite feasible and in this respect numerous periodicities are discussed in detail.

In a summary the author states that epidemics form one of the commonest factors responsible for fluctuations in numbers of wild animals, and are common in populations of wild animals including species little influenced by contact with the diseases of human beings or domestic animals. The adoption of the forecasting method described will make possible the prediction of many other wild mammal epidemics and render intensive pathological and epidemiological studies more practicable than hitherto.

G. W. DUNKIN.

IMMUNITY.

ZOZAYA, J. (1932). **Carbohydrates adsorbed on Colloids as Antigens.**—*J. Exp. Med.* **55.** 325-351. 28 tables. [26 refs.]

Evidence is given that polysaccharides can be rendered antigenic by haptogenic adsorption on a colloid carrier. The polysaccharides studied were those of *B. anthracis*, the meningococcus, *Streptococcus viridans* (Bargen), *B. proteus*, *B. morgani*, *B. dysenteriae* (Shiga and Hiss types) and the pneumococci. All were non-antigenic when used alone. The carrier chiefly used was a carefully prepared suspension of collodion particles ; positive results were also obtained with casein, alumina and living bacteria. In the latter case a better response was obtained to the bacterial carrier than to any of the adsorbed polysaccharides.

The response was measured by means of agglutination and precipitation tests, the titre obtained being in some cases high. In certain experiments it was shown that multivalent sera could be produced by successive adsorption on to the same carrier.

With the polysaccharide of Type III pneumococcus adsorbed to collodion particles anticarbohydrate antibodies were produced, but no detectable protective antibodies within six weeks.

Dextran, free from nitrogen, was also rendered antigenic by adsorption on to collodion particles.

A. W. STABLEFORTH.

I. VALLERY-RADOT, P., MAURIC, G., HUGO, A., & GIROUD, P. (1931). Sensibilisation du lapins par des extraits protéiniques. [**Sensitization of Rabbits by Extracts of Protein**].—*C. R. Soc. Biol. Paris.* **107.** 625-626. [2 refs.]

II. VALLERY-RADOT, P., MAURIC, G., HUGO, A., & GIROUD, P. (1931). Un nou veau test d'anaphylaxie chez l'homme : le serum d'un homme sensibilisé injecté à un lapin préparé avec la proteine sensibilisante peut déclancher un choc. [**A New Test for Anaphylactic Reactions in Man ; the Serum of a Sensitized Man injected into a Rabbit prepared with the Sensitizing Protein can cause Shock**].—*Ibid.* 627-628. [1 ref.]

III. Vallery-Radot, P., Mauric, G., Hugo, A., & Giroud, P. (1931). Anaphylaxie passive. Essaies de transmission des anticorps anaphylactiques de l'homme au lapin. [**Passive Anaphylaxis. Attempts to transfer Anaphylactic Antibodies from Man to Rabbit.**]—*Ibid.* 795-797.

IV. Vallery-Radot, P., Mauric, G., Hugo, A., & Giroud, P. (1931). Anaphylaxie passive. Injections au lapin du serum d'un homme sensibilisé mélangé à la protéine sensibilisante. [**Passive Anaphylaxis. Injection into Rabbits of the Serum of a Sensitive Man mixed with the Sensitizing Protein**].—*Ibid.* 797-798.

The authors investigated some experimental anaphylactic shocks in rabbits as evidenced by a fall in blood pressure shown on a sphygmograph. They used a variety of protein extracts to sensitize the animals and inoculated the test dose of protein at least 15 days later. The best results were obtained with a horse protein extract, but not owing to the high total nitrogen value of this substance as was at first suspected.

Six positive results were obtained in 16 attempts to produce shock in sensitized rabbits by the inoculation of sera from persons known to have special anaphylactic reactions, but the use of this method in the determination of specific anaphylactic tendencies is not practicable owing to the difficulties met with in sensitizing the rabbits.

Efforts at transferring passive anaphylaxis from man to rabbits all proved unsuccessful as no shock was obtained whether the sensitizing protein was injected after the serum transfer or mixed with serum under varying conditions and for varying periods prior to the inoculation of the mixture.

NORMAN HOLE.

Heidelberger, M., & Kendall, F. E. (1932). **Quantitative Studies on the Precipitin Reaction. The Determination of Small Amounts of a Specific Polysaccharide.**—*J. Exp. Med.* **55.** 555-561. 4 tables, 1 chart. [5 refs.]

A method, based on the precipitin reaction, is given for the micro-determination of the specific polysaccharide of Type III pneumococcus (termed S III). As little as 0·01 mg. can be determined. It is necessary to have at hand a homologous antibody solution which has been standardized. The standardization is made with known amounts of S III and a curve prepared by plotting the nitrogen precipitated against the amount of S III used. The quantity of S III in an unknown solution is then read from the curve after a determination of the amount of nitrogen it precipitates from the standardized antibody solution. In all determinations the antibody must be in excess.

It is suggested that the method should be applicable to any specific polysaccharide.

A. W. STABLEFORTH.

la Terza, E. (1931). Sulla deviazione del complemento nei conigli trattati con bacilli tubercolari del tipo umano e del tipo bovino. [**Deviation of Complement in Rabbits treated with Human and Bovine Tubercle Bacilli**].—*Ann. Med. nav. col.* **9.** 128-143. 3 tables. [36 refs.]

At intervals of ten days, rabbits were given three intravenous inoculations of 5 c.c. each of suspensions of bovine and human strains of tubercle bacilli killed by heating to 70° C. At the time of the inoculations and seven days later the serum of each rabbit was tested for complement-fixing antibodies against human and bovine

peptone-water antigens (Calmette and Masson). It was found that a reaction was constantly obtained, but not before the 20th day from the commencement of the treatment and that the use of the human antigen in the test invariably gave the higher reading, even with sera from rabbits inoculated with bacilli of the bovine type.

The total number of rabbits used in the experiment was ten.

R. S. ROBERTS.

HAPPOLD, F. C., & TAYLOR, A. (1931). **The Lipolytic Activity of Tubercular Guinea Pigs' Tissues. III. Variation of Activity with the Spread of the Disease.**—*Brit. J. Exp. Path.* **12.** 272-278. 5 tables. [7 refs.]

The contradictory evidence which has been presented from time to time with regard to the lipolytic activity of the body tissues in tuberculous infections prompted the authors to carry out a series of experiments with guinea pigs.

The method of extraction and estimation of the esterase from the lungs, liver and kidneys is described. After finding that there was no pronounced difference in the esterase activity of these tissues in the normal male or female or in the pregnant animal, the authors proceeded to test the effect of ultra-violet irradiation upon half of a batch of 24 guinea pigs which had been kept in the dark. They found no progressive variation in either group as compared with the normal.

In a series of guinea pigs which were inoculated with tubercle bacilli there was a definite sustained decrease in the lipolytic activity of the kidney tissue as the disease spread ; in the case of the liver there was an early drop followed by a rise with a final drop, while the lung showed a progressive increase in its lipolytic content.

N. BARRON.

GROSS, H. (1931). Das Filtrathämolysin der Staphylokokken. **[The Filtrable Haemolysin of Staphylococci].**—*Zlb. Bakt. I. (Orig.).* **123.** 212-218. 1 table. [9 refs.]

A study was made of the filtrable haemolysin of 25 strains from each of the three groups into which 250 strains of staphylococci from various sources had been previously arranged. Group I was actively haemolytic on blood agar plates, produced marked necrosis when injected intracutaneously into rabbits and coagulated citrated rabbit plasma within one or two hours ; Group II was moderately haemolytic and produced a less severe reaction in rabbits, but coagulated rabbit plasma ; whilst Group III was negative to all three tests. The strains were grown in ordinary 1 per cent. peptone broth and portions were removed daily, filtered and titrated with 1 c.c. of 1 per cent. rabbit cells. In the case of Group I strains, haemolysin was first detected after one to seven days and reached its peak after 12 days (m.h.d. 0·02 to 0·0005 c.c.) ; in the case of Group II it did not appear until 12 to 18 days and was of lower potency (m.h.d. usually under 0·2 c.c.) ; Group III strains produced no haemolysin.

In other experiments, it was found that rabbit cells were most easily lysed, ox cells less easily and sheep and goat cells distinctly less so, whilst those of man, the horse and the guinea pig showed no lysis.

The addition to the broth of haemoglobin from man, the rabbit or the horse, or of serum from man or the rabbit was of advantage, whilst the medium of Neisser and Wechsberg was also useful. The poor production of haemolysin in media

containing horse, sheep and ox serum is believed to be due to the high content of normal antibodies in these sera. Haemolysin was also obtained on solid media. Good antihaemolytic sera were prepared by subcutaneous or intravenous injection of potent haemolysin in horses or rabbits.

A. W. STABLEFORTH.

CRADDOCK, S., & PARISH, H. J. (1931). **The Serum Treatment of Anaerobic (*Vibrion septique*) Infections in Mice.**—*Brit. J. Exp. Path.* **12.** 389-393. 2 tables. [3 refs.]

Antitoxic sera have been used for a long period in the prevention and treatment of anaerobic infections, but a recent article [ROBERTSON & FELIX. (1930). *Brit. J. Exp. Path.* **11.** 14.] suggested that the ideal serum should also contain antibacterial elements. Craddock and Parish have carried out experiments on mice with a view to determining how far antitoxic sera would protect, as they were unable to carry out experiments with antibacterial sera. Their results with mice indicate that *Vibrion septique* antitoxic serum is able to confer complete protection against massive doses of living *V. septique* and that it is highly effective in the prophylaxis and treatment of infections produced by washed spores with calcium chloride as an activator. Concentrated antitoxin injected intravenously or intraperitoneally in divided doses protected from 75 to 100 per cent. of mice against 100 doses of spore-activator mixture. Mice which were nearly moribund five hours after infection recovered after the intravenous administration of antitoxin. The important deduction made from these experiments is that when antitoxin is used therapeutically in anaerobic infections it should be given without delay in large doses and by the intravenous route.

R. LOVELL.

GOLDIE, H. (1931). Absorption et destruction des substances inhibitrices de filtrats microbiens. [**Absorption and Destruction of the Inhibitory Substances of Microbial Filtrates**].—*C. R. Soc. Biol. Paris.* **108.** 762-764.

Filtrate from a thirty day culture of a coliform organism, previously heated at 65° C. for one hour, was placed in contact with a layer of agar prepared with water ; an equal amount of saline was placed in contact with a similar layer of agar. After 16 hours the fluids were transferred to other tubes and both these and the agar slopes were seeded. Abundant growth occurred in the filtrate, whilst that in the saline was poor. In contrast, the growth on the agar which had been in contact with the filtrate was fine, and discontinuous, whereas that obtained on the agar which had been in contact with saline was abundant. The inhibitory agent was also absorbed by cubes of egg and by liver.

In other experiments filtrate was treated for 4 hours with decinormal hydrochloric acid and then neutralized, or it was treated with oxidizing agents such as hydrogen peroxide. Good growth resulted. Treatment of the filtrates by ether or acetone did not destroy the inhibitory substance.

Analogous findings were obtained with filtrates from coliform organisms, staphylococci, *B. proteus*, *B. botulinus* and streptococci.

It is concluded that the inhibitory phenomenon which is observed in filtrates of old cultures is due to soluble alkaline bacterial products which can be absorbed by various colloids but not by kaolin ; that they are easily oxidized and are destroyed by acids. These characters correspond to those of aminoid substances which are liberated under certain conditions in the course of cellular disintegration.

A. W. STABLEFORTH.

KUMAGAI, K. (1931). De la vaccination antityphique par la voie buccale au moyen du vaccin bilié, d'après le procédé de Besredka. [**On Antityphoid Vaccination by the Buccal Route with Bile-treated Vaccine, according to the Method of Besredka**].—*C. R. Soc. Biol. Paris.* **108.** 373-374. 3 tables.

From a consideration of the morbidity and mortality in about 2,500 doctors, hospital attendants and others particularly exposed to infection, all of whom were vaccinated, and a comparison of the morbidity and mortality in groups of 352 vaccinated and 1,189 non-vaccinated nurses, it is concluded that vaccination by the mouth with bile-treated vaccine, which is simple and practical and attended by no reaction, must be considered as an efficacious means of preservation against typhoid. The communication comes from a typhoid hospital, in which the incidence of contact infection was high.

A. W. STABLEFORTH.

MAGHERU, G., & MAGHERU, A. (1932). Recherches sur la vitesse de fixation au cours de l'immunisation. [**Experiments on the Rapidity of Fixation in the course of Immunization**].—*C. R. Soc. Biol. Paris.* **109.** 770-772. 1 table. [1 ref.]

From experiments with antisera from twelve rabbits which were injected with cholera vibrios and bled on three occasions at intervals from 24 hours to 11 days after injection, it is concluded that the speed of fixation does not run parallel with the titre of the serum and that, in general, it becomes more rapid as the sensitizing antibody is provided by the serum of a rabbit nearer the end of immunization ; in the case of antigen-antibody systems containing sera obtained 9 to 11 days after the last injection the speed of fixation was in all cases greater than that for sera obtained earlier.

The preparation of the antigen and method of determining the speed of fixation were described in an earlier note [(1931). *C. R. Soc. Biol. Paris.* **107.** 411].

A. W. STABLEFORTH.

PUBLIC HEALTH.

I. KLIMMER, M. (1932). Abortus Bang und Milchhygiene. I. Mitteilung ; Bluttiter. [*Br. abortus* **and Milk Hygiene. Part I. Blood Titre**].—*Berl. tierärztl. Wschr.* **48.** 87-94. 6 tables. [72 refs.]

II. MURRAY, C., MCNUTT, S. H., & PURWIN, P. (1932). **The Effect of Pasteurization upon Brucella melitensis var. suis.**—*J. Amer. Vet. Med. Ass.* **80.** 336-342. [4 refs.]

I. The greater part of this article, which is unsuited to abstraction, consists of a general review of the subject indicated and contains a useful list of references, particularly to German work. Some new observations are reported on the question of the correlation of serum agglutination and excretion of brucella, but they are limited and, as the author himself points out, the conclusions reached must therefore be regarded as tentative. The general conclusion is that, if all cows with agglutination titres below 1 : 100 or 200 were classed as non-excretors and all cows with titres of 1 : 3,000 or over were classed as excretors, little serious error would result, and that the number of cows requiring further examination would be reduced by 40 or 50 per cent.

II. From the results of three experiments in which four agar slants of virulent porcine strains of *Br. abortus* were added to 15 gallons of milk, it is concluded

that a temperature of 62° to 63° C. for three minutes suffices to kill the brucella and that therefore the usual pasteurization process at 62° to 63° C. for 30 minutes gives an ample factor of safety, provided that the pasteurizer is properly operated. Other experiments showed the necessity of keeping the pasteurizer closed and of fitting a flush gate-valve instead of a faucet outlet in which organisms were found viable after 30 minutes.

A. W. STABLEFORTH.

DALRYMPLE-CHAMPNEYS, W. (1931). **Undulant Fever conveyed by Milk.**—*Brit. Med. J.* Aug. 8th. 260.

—. (1931). **Milk-borne Streptococcal Infections.**—*Ibid.* 261-262.

I. The author referred to 34 definite cases of undulant fever conveyed by milk reported in England and to five such cases in Scotland. He commented on the surprising paucity of cases in comparison with the incidence of contagious abortion in cows.

II. At a meeting of the Sections of Pathology and Biochemistry at the Annual Meeting of the British Medical Association, Dr. E. WILKINSON reported an outbreak of scarlet fever and sore throat in people who had been drinking raw milk supplied from one dairy. The trouble was traced to milk containing abundant streptococci supplied from a farm on which the dairy hygiene was very satisfactory. Proof that cows were associated with the human infection was obtained by deductive reasoning, but no particular cow or cows were implicated. Dr. R. A. GLEGG suggested that medical practitioners should always endeavour to trace the source of infections suspected of being caused by milk and that compulsory notification of cases of sore throat and diarrhoea in persons handling milk should be instituted. He urged further that there should be much wider expert milk control. Brief reference to undulant fever caused by *Br. abortus* was also made.

J. E.

I. ILZHÖFER, H. (1931). Ueber den Nachweis stattgehabter Erhitzung der Milch. [**Proof of Pasteurization of Milk**].—*Arch. Hyg. Berlin.* **105.** 319-321. [5 refs.]

II. KOHN, F. G., & KLEMM, E. (1932). Eine einfache Reaktion zur Feststellung des Alkalizusatzes zur Milch. [**A Simple Reaction for detecting the Addition of Alkali to Milk**].—*Prag. Arch. Tiermed.* **12.** 137-140. [3 refs.]

I. This paper deals with the estimation of the temperature to which milk has been heated and should therefore be considered in conjunction with the group of papers on the same topic reviewed below.

The test depends upon the destruction of the peroxidase in raw milk, the reagent being prepared by mixing one part of a 1 per cent. tolidine solution (0·5 g. orthotolidine dissolved in 5 c.c. cold glacial acetic acid, then diluted to 50 c.c. with water) with 5 parts of a 1 per cent. solution of hydrogen peroxide.

The test is carried out by shaking 5 c.c. of milk " lead serum " (filtrate from milk precipitated with basic lead acetate as in the Rothenfusser test) with 0·5 c.c. of recently mixed reagent and noting the immediate colour reaction. In the case of fresh milk a deep blue colour is produced at once. Milk heated for half an hour at 63° to 65° C. (low temperature pasteurization) gives a blue-green colour, at 70° C. (German stock diseases regulations) a feeble green-blue and at 75° C. no colour at all. Milk heated for only one or two minutes at 83° to 85° C. also gives no colour,

indicating the rapid destruction of the peroxidase at the higher temperature. Colours fade after about 15 minutes.

II. In this paper the author discusses sophistication of milk by addition of alkali, generally sodium bicarbonate, with the object of masking the souring produced by bacterial multiplication.

He reports upon the detection of added alkali by means of a reagent received from Professor SCHERN of Montevideo, which gives a rapid colour reaction with even one part of bicarbonate in four thousand parts of milk. The reagent is termed " Lechale " but since the composition has not yet been published by SCHERN and GORLI, the data of the authors lose much of their interest.

H. H. GREEN.

I. GOULD, B. S. (1932). **The Detection of inefficiently Pasteurised Milk based on a Modification of the New Rotherfusser Test.**—*J. Dairy Sci.* **15.** 230-241. [10 refs.]

II. SCHERN, & GORLI. (1932). Technique d'une nouvelle réaction pour déceler la pasteurisation du lait au-dessus de 58 degrés. [**Technique of a New Reaction for detecting Pasteurization of Milk above 58° C.**].—*Le Lait.* **12.** 17-19. [3 refs.]

III. KOHN, F. G., & KLEMM, E. (1932). Sur le diagnostic du lait pasteurisé à basse température par l'anneau de Schern-Gorli. [**On the Detection of Low Temperature Pasteurization of Milk by the Schern-Gorli Ring Test**].—*Ibid.* 19-21. [2 refs.]

IV. KOHN, F. G., & KLEMM, E. (1932). Die Schern-Gorlische Ringreaktion zur Unterscheidung von roher und erhitzter Milch. [**The Schern-Gorli Ring Test for distinguishing between Raw and Heated Milk**].—*Zschr. Infektkr. Haust.* **39.** 82-93. 2 figs. [7 refs.].

V. KERN, A. (1931). Ueber das Verhalten von Suspensionen in der Rohmilch und in erhitzer Milch, mit Berücksichtigung der Reaktion von Schern-Gorli. [**On the Behaviour of Suspensions in Raw and in Heated Milk with Reference to the Schern-Gorli Reaction**].—*Prag. Arch. Tiermed.* **11.** 253-260. [13 refs.]

A series of papers dealing with the estimation of the temperature to which milk has been heated in pasteurization.

I. This paper deals with a modification of the Rotherfusser diastase test. A lead acetate filtrate of milk is incubated with specially prepared starch solution, dilute iodine is then added and the colour observed. A yellow colour (complete hydrolysis of the starch) indicates raw milk or milk not heated above 50° C. A red-orange colour (due to erythrodextrin) indicates inadequate pasteurization. A blue colour (due to starch) indicates heating above 60° C. A colour scale is used and the test is claimed to detect as little as 1 per cent. of raw milk in pasteurized milk.

II. The authors aim at discriminating between milks pasteurized over the range 58° C. to 70° C. and use the changes in surface tension phenomenon as basis of the test. The milk is incubated for two hours at 38° C. after addition of washed red blood corpuscles. With fresh milk the corpuscles rise with the fat, giving a reddish cream zone. With milk heated to 70° C. they sink to the bottom, giving a disc-like sediment. Milk heated to 58° C. gives an intermediate reaction—a veil-like sediment sometimes associated with a rose-coloured ring. To distinguish milk heated above 70° C., the usual guaic peroxidase test is applied.

Charcoal may be used instead of corpuscles, the " Schern-Gorli ring " then being blackish.

III & IV. These two papers deal with the movements of insoluble powders such as charcoal, carmine and indigo in milks heated to various temperatures. At 58° C. to 60° C. the fat globules lose their power of attracting fine particles in suspension. Good results are reported for the Schern-Gorli ring test in commercial practice.

V. This paper discusses the physical chemistry of milk and the theory of the reactions which give rise to the " Schern-Gorli ring " and reports satisfactory results with the test itself.

[A much fuller abstract of this series of papers, with a summary of earlier tests such as Arnold's reaction, Storch's test, Schaordinger's test and the original Rotherfusser reaction, is available in the bureau office and could be supplied to those interested.—Ed.]

H. H. GREEN.

KERN, A. (1931). Ueber die Reaktion von Schern-Gorli in pasteurisierten Milch. [**The Reaction of Schern-Gorli in Pasteurized Milk**].—*Prag. Arch. Tiermed.* **11.** 315-317. 2 tables. [4 refs.]

The Schern-Gorli reaction was given within two hours by milk heated in the laboratory to from 63° C. to 64° C. and then cooled to 3° C., but not by milk pasteurized at 74°, 70°, 65° or 64° C. for half an hour and then cooled to 5° C. The pasteurizer was one in which a centrifuge was used for clarifying.

The author points out that the Schern-Gorli reaction is closely connected with the property of cream separation and KIRCHNER has suggested that this may be affected by subjecting milk to mechanical processes during pasteurization.

U. F. RICHARDSON.

ALLEN, L. A. (1932). **The Properties of Milk in Relation to Condensing and Drying of Whole Milk, Separated Milk and Whey.**—*Hannah Dairy Res. Inst. Bull.* No. 3. pp. 159. 10 figs., 54 tables. [233 refs.]

An exhaustive review of the subject indicated by the title, undertaken by the Hannah Institute, Kirkhill, Ayr.

The publication is divided into eight parts, each consisting of a critical sub-review, in chronological order, of the work of the various individual investigators classified in the alphabetical bibliography. The adoption of this method, together with the well-arranged sub-headings, makes the monograph very readable.

The first three sections deal with the composition of the milk, the nature of individual constituents and their normal range of variation, the colloidal properties of milk, the effects of heat on its physical characters and bacterial flora and the general relation of each of these factors to condensing and drying.

The four following sections deal with the technical problems involved in the manufacture of sweetened condensed milk, evaporated milk, milk powders and condensed and dried whey.

In each section the author deals successively with the process of manufacture, the bacteriological and chemical considerations involved and the nature of the more common defects and their methods of elimination. A final section deals briefly with the utilization of the manufactured products and their nutritional value.

The publication provides valuable material for use of those concerned in the technical development of condensing and drying of milk, but there are also many references of interest to the public health official and the veterinarian as, for example, the discussion on pages 120-130 of the survival of pathogenic organisms in milk powders.

H. H. GREEN.

I. M'Candlish, A. C., & Cochrane, J. (1930). **A Comparison of Hand and Machine Milking.**—*W. Scotland Agric. Coll. Bull.* No. 121. 259-307. 17 tables. [44 refs.]

II. Leitch, R. H. (1930). **The Cleaning and Care of Milking Machines.**—*Ibid.* 311-323. [8 refs.]

I. Results are reported for 158 lactations of 51 cows in two herds ; these are spread over three years and the trials thus rank with the largest previously conducted. Two machines, a Vaccar and a Wallace, both of which worked on an intermittent vacuum of about 15 inches, were compared with hand milking. The two machines were equal in efficiency. With efficient operation there was no significant difference in the yields of milk and butter fat as compared with hand milking and the method of milking did not affect the length of lactation. It is to be noted, however, that on one farm a distinct drop in milk yield and fat percentage occurred during the first year of machine milking. This seems to be attributed to inefficient operation and in the following year production was normal. Young cows unaccustomed to hand milking took readily to the machines ; old cows sometimes did so less rapidly. There was no great difference in the rate of milking, which was influenced chiefly by the yield and individuality of the cow. When properly operated no deleterious effects on the udder or teats were noted, but with indifferent operation it is suggested that congestion may be caused. Stripping is regarded as necessary in some cases, but is better dispensed with wherever possible as cows may learn to retain some milk for the stripper. Emphasis is laid on the fact that the efficiency of the operator—e.g. in seeing that teats are not doubled up, and that the speed of the machine is suited to the varying requirements of different cows—is of more importance than that of the type of machine.

The question of cost of working, which naturally depends chiefly on the size of the herd and local wage conditions, is discussed in regard to Scotland ; it is suggested that the installation of a milking machine would not be justified economically in a herd of less than from 40 to 60 cows. It is recommended that cows affected with mastitis should be milked by hand or after the remainder and the machine then thoroughly sterilized ; further, that, in order to prevent spread from latent cases, the teat cups should be dipped in fresh strong chlorinated water and then boiled water, and that all udder cloths should be treated with a disinfectant.

II. It is concluded that milk satisfactory from a bacteriological point of view can be produced with machines. The machine should be completely disassembled twice a week and thoroughly cleaned and sterilized. The rubber parts, the chief source of infection, can only be kept in a satisfactory condition if preliminary washing is effective. Thorough hot water treatment (165° C. for 30 minutes) followed by storage in a cold place or in cold running water may be useful, but better results are obtained by keeping the teat cups and associated tubes (avoiding air locks) in cold saturated brine to which hypochlorites or chloramine are added to give a strength of 100 parts of chlorine per million parts

of water. Details of the methods are given. In addition, the rinsing of the rubber tubes and teat cups by drawing hot water through them just before milking is regarded as an excellent procedure.

A. W. STABLEFORTH.

SULMANN, F. (1931). Serologische Untersuchungen über Fleischfaülnis mit Hilfe der Komplementbindung, Präzipitation und Agglutination. I. Präzipitation. II. Komplementbindung und Agglutination. [**Serological Investigations of Putrefaction of Meat by Means of Complement-Fixation, Precipitation and Agglutination. I. Precipitation. II. Complement-Fixation and Agglutination**].—*Zschr. Immun. -Forsch.* **70.** 472-476 and 477-496. 6 tables. [54 refs.]

I. Rabbits were immunized with extracts of beef which had been allowed to putrefy at 37° C. By means of precipitation, reactions were obtained with homologous extracts, and extracts from beef which had putrefied at 10° C. and, to a less degree with those from putrefied mutton and goat flesh and fresh beef. A slight reaction was also obtained with extracts from fresh mutton and goat flesh. Extracts made at 37° C., or better at 100° C., from bacteria cultivated from the putrefied flesh also gave a low degree of reaction.

II. Complement-fixation was somewhat better than precipitation, but reactions were still obtained, though to a less degree, with fresh flesh of the same and of another animal. Certain sera gave reactions with watery extracts of the bacteria cultivated from the flesh, but no reaction was obtained with alcoholic extracts. The bacteria were also agglutinated. Fixation was also obtained with putrefied pork, and with the putrefied flesh of horses, dogs, cats and rabbits. A serum prepared with putrefied horse flesh also reacted with extracts of various kinds of flesh in the putrid condition. In rabbits, on the other hand, no antibodies were evoked by injection of putrefied rabbit flesh.

The author concludes that three sources of antibody production are involved, normal albumens, bacterial antigens and a new substance which may be of haptene nature or may be of full antigenic character.

Recognition of the new antigens succeeded only after flesh had remained two days at 37° C. or longer at 10° C. The method is therefore of no practical value.

A. W. STABLEFORTH.

I. SCHOON, J. G. (1932). De colorimetrische bepaling der Waterstofionen-concentratie in vleeschextracten en de Waarde hiervan voor de beoordeeling van vleesch van zieke dieren. [**The Colorimetric Determination of the Hydrogen-ion Concentration in Meat Extracts and their Value for the Detection of Meat from Diseased Animals**].—*Tijdschr. Diergeneesk.* **59.** 81-94. [Summaries in English, French and German : abst. from orig.]

II. POSTMA, C. (1932). Eenige opmerkingen over de bepaling der Waterstofionen-concentratie van vleeschextracten. [**Observations regarding the Determination of the Hydrogen-ion Concentration in Meat Extracts**].—*Ibid.* 316-320.

I. The author finds that the Michaelis-Walpole method is reliable and practicable for the determination of the hydrogen-ion concentration of meat extracts.

In the case of extracts made from meat of diseased animals, the determination

of the pH furnishes an indication of the extent to which the disease has affected the meat. As a rule the test enables an immediate judgment to be formed as to the suitability or otherwise of horseflesh for human consumption. Doubtful cases rarely occur. Meat extracts giving an amphoteric or an alkaline reaction are favourable media for bacterial multiplication and are consequently liable to be a source of food poisoning.

The author is of the opinion that the determination of reaction of extracts of meat from diseased animals should be legally enforced.

II. The author offers some criticisms of the papers on this subject published by Fooy and Schoon, and promises a detailed account of his own investigations later. For the time being he states that his investigations have led him to the following principal conclusions :—(1) a more extensive investigation of the pH of muscular tissue in absolutely normal pigs is very desirable. The fat content of muscular tissue must be taken into account and (2) in pigs there is a greater variation in the pH of various groups of muscles than is the case in bovines.

A. LESLIE SHEATHER.

THERAPEUTICS.

Kolmer, J. A., Brown, H., & Harkins, M. J. (1931). **A Note on Tin Compounds in the Chemotherapy of Experimental Staphylococcus Infections.**—*J. Pharmacol.* **43.** 515-519. 3 tables. [1 ref.]

Clinical reports on the alleged therapeutic value of stannoxyl in the treatment of furunculosis and other staphylococcus infections stimulated the authors' interest in the chemotherapy of staphylococcus infections.

In this paper the results of experiments carried out with compounds of tin other than stannoxyl are recorded. The three tables included in the text present (1) a summary of the compounds employed including their formulae, the percentage of metallic tin in each and their water solubility ; (2) a summary of the bactericidal results *in vitro* and (3) a summary of the results of the toxicity tests by intravenous injection into rats. In these experiments toxicity tests were conducted by the intravenous injection of freshly prepared solution into white rats. It was found that analine stannochloride was most toxic and stannoxyl the least toxic.

Rabbits were used in testing for therapeutic value and each received two inoculations with the staphylococcus by intravenous injection, the compounds being similarly injected, but daily or every other day until eight doses had been given. The first dose was given four hours after the second injection of culture. None of the animals succumbed to toxic effects of the compounds, while the controls lost rapidly in weight. The authors conclude that " the compounds tested were without therapeutic effects."

G. W. DUNKIN.

Malik, M. (1931). **Treatment of Micro-Filaria in Horses.**—*Vet. J.* **87.** 578-580. [3 refs.]

Repeated examinations of the blood from the peripheral circulation of a horse carrying microfilariae showed no evidence of any periodicity in their appearance.

Trials carried out *in vitro* to ascertain the effect of various drugs on microfilariae in citrated equine blood showed tartar emetic to be the most toxic.

Treatment of the horse with this drug was then tried ; a dose of 10 grains being given intravenously in distilled water followed at intervals of three days by two doses of 15 grains and seven days later by another dose of 15 grains.

On the day following the first treatment, the numbers of microfilariae were found to have greatly decreased ; after the second treatment they completely disappeared, and on all of the several examinations carried out during the following six months the blood remained free.

E. L. TAYLOR.

I. KEMP, A. H. (1931). **Intestinal Parasites : a Suggestion in the Method of Treatment.**—*J. Amer. Med. Ass.* **96.** 1948-1949.

II. GUNN, H. (1931). **The Treatment of Tape Worm through Duodenal Tube.** —*Amer. J. Trop. Med.* **11.** 273-277. [7 refs.]

III. GUILLON. (1931). A propos du traitement des distomatoses hépatiques. [**The Treatment of Trematode Infestations of the Liver**].—*Ann. Méd. Pharm. col.* **29.** 332-336. [9 refs.]

I. Three thousand cases of infestation of man with tapeworms, hookworms and ascarids have been treated by the author without any preliminary fasting, the anthelmintic being followed by two compound cathartic pills. The worms appear to be satisfactorily removed and no untoward effects have been observed. Five reasons are given as to why, in the author's opinion, an anthelmintic may act as well or even better when the intestine is full than when it is empty. Among the particular cases mentioned is one in which a dose of carbon tetrachloride removed a tapeworm and one where 504 hookworms were removed by the same dose. It is mentioned that in this case the faeces were still laden with hookworm ova three days later.

II. Treatment by the mouth for tapeworm infestation in man is not satisfactory, the last two cases treated by the author having carried parasites for six years and thirteen years respectively and been treated on several occasions without success. Following a method which has been advocated by others he has tried the administration of an emulsion of male fern extract and magnesium sulphate through the duodenal sound and found it much more efficacious and at the same time less toxic and nauseating.

III. The value of extract of male fern for the destruction of *Clonorchis sinensis* in man has previously been mentioned by the author, but appears to have been subsequently overlooked. Filicin is absorbed in the small intestine and excreted with the bile in much the same way as bile salt is absorbed and excreted. Contrary to what is usually stated, it may be administered with an oily purgative and in this way has been used with great success in veterinary practice ; as, however, intoxications are known to occur in man it is better to use a calomel and filicin mixture and to follow with a saline purgative.

E. L. TAYLOR.

CARMAN, J. A. (1931). **A Note on the Clinical Aspect of the Treatment of Taeniasis with Carbon Tetrachloride.**—*Trans. Roy. Soc. Trop. Med. Hyg. London.* **25.** 187-190. [8 refs.]

The use of carbon tetrachloride and oil of chenopodium in the proportion of 3 : 1 is recommended for the treatment of human taeniasis, the dose of the mixture being 80 minims for the adult. Between 2,500 and 3,000 doses have now been given to natives on the borders of Lake Victoria Nyanza without any untoward results and, as far as could be ascertained from interrogation of the patients and from the popularity of the treatment, it is successful in removing

the tapeworms. [Carbon tetrachloride and oil of chenopodium are usually considered to have little or no action on cestodes, tests on experimental animals having shown their efficacy for the expulsion of these worms to be very low].

E. L. TAYLOR.

ERHARDT, A. (1932). Chemotherapeutische Untersuchungen an der Opisthorchiasis der Katzen. I. [**Investigations on the Chemotherapy of Opisthorchiasis in Cats. I.**].—*Arch. Schiffs- u. Trop.-Hyg.* **36.** 22-31. 3 tables, 1 chart. [9 refs.]

Experiments have been carried out to ascertain the action of three different drugs on opisthorchis in the cat, this being determined by means of egg counts and by *post-mortem* examinations carried out at the end of the period of observation.

Carbon tetrachloride was tried on six infected cats in doses of from 2 to 4 c.c. Although in one instance the larger dose killed all the worms, smaller doses were much less effective, 2 c.c. in one instance failing to kill any of the 25 worms present.

Gentian violet was tried on three infected cats and in a dose of 0·33 g. per kg. of body weight proved to be quite ineffective ; 0·66 g. per kg. given to the other two cats, however, removed 62·2 per cent. of the worms from the one and 76·0 per cent. from the other.

Fuadin, tried subcutaneously on seven cats, gave excellent results in doses varying from 0·2 c.c. to 0·4 c.c. per kg. Six of these cats received only one dose of 0·4 c.c., all the worms being killed in four, 99·4 per cent. in one of the remaining two and 50 per cent. in the other. It is thought that cats infected with this parasite will prove valuable experimental subjects for the trial of other kinds of parasiticidal antimony preparations intended for use on the human subject.

E. L. TAYLOR.

HENRY, A. (1931). Les nouvelles médications anthelmintiques. [**Modern Anthelmintic Treatments**].—*Rec. Méd. vét.* **107.** 730-762. 9 tables.

This paper, read before the Third Veterinary Congress at Alfort, gives a general resumé of the present knowledge of anthelmintic medication. A short account is given of the methods employed in the testing of anthelmintics, of the several general considerations in their use, the preparation of the animal, the method of administration and the purgative. Notes are given on the properties and uses of kamala, male fern, oil of chenopodium, pyrethrins, chloroform, hexachlorethane, tetrachlorethylene and carbon tetrachloride. The tables published by LE ROUX in 1930 which indicate the best treatments for the various parasites of domestic animals form a useful addition to the paper and give it a wide appeal to practitioners in veterinary medicine.

[The mention of experiments carried out by MONTGOMERIE in Central Africa on the use of carbon tetrachloride in fascioliasis presumably refers to the experiments of R. F. MONTGOMERIE carried out in North Wales].

E. L. TAYLOR.

I. ROSKIN, G., & ROMANOWA, K. (1931). Arzneimittel und Ultraviolette Strahlen. X. Mitteilung. Bestrahltes Chinin bei Vogelmalaria. [**Medicinal Drugs and Ultraviolet Rays. Part X. Irradiated Quinine in Avian Malaria**].—*Zschr. Immun.-Forsch.* **72.** 445-449. 2 tables. [1 ref.]

II. Lotze, H. (1932). Die künstliche Proteosomainfektion der Vögel. 3 Mitteilung. Ein Beitrag zur Frage der Therapie bei Vogelmalaria. **[Experimental Infection of Birds with Proteosoma. Part III. A Contribution to the Therapy of Avian Malaria].**—*Zlb. Bakt. I. (Orig.).* **124.** 161-167. 5 graphs. [1 ref.]

I. In previous experiments with paramoecium the authors found that, while quinine solutions of certain strengths and ultraviolet rays in certain doses were without effect, the quinine became highly toxic for the organism when the solution was irradiated before use.

In this paper they record experiments upon birds, infected with plasmodia, which were treated with irradiated quinine and ordinary quinine. The former solution proved to be of higher therapeutic value.

II. The author finds that malaria parasites in birds can be made to disappear from the circulation by the intra-muscular injection of freshly obtained blood or serum from an infected bird, or a suspension of parasitized blood corpuscles in normal saline.

It is suggested that similar experiments in the human subject might prove to be of value.

A. LESLIE SHEATHER.

Greville, G. D. (1931). **Study of the Blood-Calcium following the Intravenous Injection of Calcium Salts.**—*Biochem. J.* **25.** 1931-1942. [54 refs.]

Several workers have reported that the intravenous injection of calcium salts causes only a very transitory rise in blood calcium, the greater part disappearing from the circulation in a matter of minutes and normal level being re-established within a few hours.

The author studied the kinetics of the process and after showing that the observations were not due to faulty technique demonstrated that the rate of fall of serum calcium, following injection of calcium chloride or levulinate into cabbage-fed rabbits, is approximately proportional to the excess of calcium above the constant level. During the first five minutes, however, there was a large disappearance not accounted for by this relationship.

The explanation given is that immediately after the injection of hypertonic solutions of calcium salts into the blood stream calcium diffuses into the tissues until some form of equilibrium is established with the artificially raised blood value. The added calcium then continues to disappear at a rate proportional at any instant to the excess above normal, until at the end of two or three hours the content of both tissues and blood has returned to the usual level. There is some doubt concerning the detailed subsequent fate of the calcium, part being excreted quite quickly and part apparently stored in the bones and only slowly excreted over many days.

H. H. GREEN.

I. Hultén, O. (1931). Kalciumterapi vid paresis puerperalis. **[Calcium Therapy in Milk Fever].**—*Svensk Vet.-tidskr.* **36.** 283-287.

II. Hallgren, W. (1931). Kalciumterapi vid paresis puerperalis. **[Calcium Therapy in Milk Fever].**—*Ibid.* 333-336.

I. The author treated six bad relapses of milk fever with a 30-40 : 1,000 solution of calcium chloride. At the same time air was inflated in the udder. He is of the opinion that the treatment should only be used in bad relapses of milk fever and in cases where mammitis is present.

II. The author used calcium treatment in 58 cases of milk fever and no relapses occurred. On the other hand, however, phlebitis appeared as a complication in two of the cases. He recommends injection into the mammary vein instead of the jugular vein. The injection should be made slowly with the solution at body temperature and a needle which is not too coarse should be used (external diameter 2 mm.).

N. LAGERLÖF (STOCKHOLM).

GANSLMAYER, R., & RAJCEVIC, M. (1931). Beitrag zur Pharmakologie, Toxikologie und Klinik des Percains mit besonderer Berücksichtigung der Wiederkäuer. [**Contribution to the Pharmacology, Toxicology and Clinical Action of Percain with Special Reference to Ruminants**].—*Tierärztl. Rdsch.* **37.** 773-777 and 797-799. 7 figs., 4 tables. [29 refs.]

Percain, a quinoline derivative described by the authors as the hydrochloride of α-butyloxycinchoninic acid-diethyl-ethylene diamide [compare HIRSCHFELDER, A. D., & BIETER, R. N. below], has been tested systematically by the authors and may be considered a valuable addition to veterinary anaesthetics.

Ganslmayer and Rajcevic give the results of their investigations on the action of percain on cattle, sheep, goats and pigs. It is very stable in solution, is unaltered by boiling and for practical purposes is best made up with physiological saline solution. The addition of adrenalin to the percain is useful (6 drops of 1 : 1,000 solution to 100 c.c. percain). Percain solution is irritant for ruminants in concentrations greater than 1 per cent. and it is considered advisable that the concentration should not be in excess of 1 : 500. Dogs are less sensitive to percain than ruminants. Toxic symptoms develop when large doses are used ; these take the form of muscular disorder (unsteadiness, opisthotonos and cramp), nystagmus and, in the pig, vomition. Death from heart failure may follow.

Percain may be employed in practice without fear of poisoning in much larger quantities than in the case of other local anaesthetics in common use. It is moreover extremely cheap.

J. E.

HIRSCHFELDER, A. D., & BIETER, R. N. (1932). **Local Anaesthetics.**—*Physiol. Rev.* **12.** 190-282. [688 refs.]

A valuable review covering the whole subject of local anaesthetics, with an exceptionally extensive bibliography conveniently arranged under subject headings —text-books, historical articles, original papers on physiological reactions, physico-chemical properties, synergistic actions, testing of efficacy, therapeutic coefficients, chemical constitution of compounds used, discussion of individual anaesthetics, actions on circulation, respiration, etc., toxicity, premedication and antidotes, methods of clinical administration, anaesthetic and lethal doses.

Although comprehensive, the review is so compact that a short abstract would be misleading, but the chemist may be referred to it for a concise summary of the constitution and properties of modern local anaesthetics, the general physiologist for an instructive presentation of a special field, the medical man and the veterinarian for recent information not readily accessible elsewhere.

The article concludes with a comprehensive table of anaesthetic and lethal doses, therapeutic coefficients, threshold anaesthetic concentrations and duration of anaesthesia for various laboratory animals and man.

H. H. GREEN.

PHYSIOLOGY.

APPERLEY, F. L., & CRABTREE, Muriel G. (1931). **The Relation of Gastric Function to the Chemical Composition of the Blood.**—*J. Physiol.* **73.** 331-343. 5 figs., 1 table. [18 refs.]

Experiments were carried out on human beings to find out how far gastric chemical activity depends entirely, if at all, on the chemical composition of the blood apart from those changes which are due to oxygenation. The acidity of the stomach contents was measured by withdrawing, at regular intervals, samples of a given test meal. The latter consisted either of a measured volume of thin gruel or of a definite volume of 0·4 per cent. hydrochloric acid. Chemical changes in the blood were induced by one of four methods.

(a) Ammonium chloride was fed to the subject the previous evening which resulted in a fall in blood pH, and a low plasma bicarbonate content.

(b) Repeated breathing of a carbon dioxide atmosphere (3 to 4 per cent.) which resulted in a fall of blood pH, but a high plasma bicarbonate content.

(c) The subject was immersed in a hot bath which procedure induced a low plasma bicarbonate and a high pH.

(d) Ingestion of sodium acetate, which produced a rise in blood pH associated with a high plasma bicarbonate.

The experimental results obtained indicate that gastric acidity varies with the fasting plasma bicarbonate, irrespective of how this is produced, or whether there is an acidaemia or an alkalaemia. The authors also conclude that the emptying time of the stomach varies with the hydrogen ion concentration of the blood.

The experiments were performed upon nine individuals, most of whom submitted to all the treatments *seriatim*.

W. R. WOOLDRIDGE.

MAGEE, H. E., & REID, E. (1931). **The Absorption of Glucose from the Alimentary Canal.**—*J. Physiol.* **73.** 163-183. 3 figs., 10 tables. [11 refs.]

Working with rats, cats and rabbits it was found that there is an optimum concentration of 0·75 M for the absorption of glucose from the alimentary tract. The presence of phosphate (0·2 per cent. at pH 7·0) increased this optimal absorption. The absorption was followed by examining the sugar contents of portal or systemic bloods.

With anaesthetized rabbits the rate of glucose absorption in the duodenum from 0·75 M to 0·1 M solutions was greater than that of water secretion, but the two processes balanced at 0·1 M and 0·2 M concentrations. In the jejunum and ileum absorption and secretion of water balanced with solutions of 0·3 M concentration. The contractility of the villi and of the muscularis mucosae of the cats' intestines was optimal with 0·75 M concentrations of glucose. The same concentrations of sucrose, maltose and lactose and also dilute solutions of bile in Tyrode's solution also favoured contractility. 0·75 M solutions of arabinose, xylose and mannose inhibited this action.

W. R. WOOLDRIDGE.

I. HEILBRON, I. M., GILLAM, A. E., & MORTON, R. A. (1931). **Specificity in Tests for Vitamin A. A New Conception of the Chromogenic Constituents of Fresh and Aged Liver Oils.**—*Biochem. J.* **25.** 1352-1366. 6 figs., 5 tables, 1 plate. [12 refs.]

II. Coward, Katherine H., Dyer, F. J., Morton, R. A., & Gaddum, J. H. (1931). **The Determination of Vitamin A in Cod-Liver Oils (a) Biologically, (b) Chemically, (c) Physically, with a Statistical Examination of the Results.** —*Ibid.* 1102-1120. 11 tables. [17 refs.]

III. Ahmad, B. (1931). **The Fate of Carotene after Absorption in the Animal Organism.**—*Ibid.* 1195-1204. 1 fig., 5 tables. [13 refs.]

I. The authors studied the nature of the chromogens of liver oils with particular reference to vitamin A.

This vitamin is colourless itself but shows selective absorption in the ultra-violet range about 328 $\mu\mu$, and with antimony trichloride forms derivatives which give rise to absorption in the visible spectrum. In the earlier stages of the reaction the absorption is in the yellow-green with maximum about 583 $\mu\mu$ but this suffers variable displacement towards 565-575 $\mu\mu$ in presence of certain unsaturated substances in liver oils.

The evidence indicates that, associated with vitamin A, there is a substance which is transparent to wave lengths near 328 $\mu\mu$ but which shares the property of acting as a chromogen towards antimony trichloride, giving rise to a compound absorbing maximally in the orange at 620 $\mu\mu$ but also suffering displacement towards 606 $\mu\mu$ in presence of certain unknown substances in fish-liver oils.

The authors discuss the ideal conditions for accurate colorimetric determination, and discuss the bearing of the data on the vitamin A problem. There are two independent chromogens X and Y present in cod-liver oil. The colour due to Y is increased by the removal of certain inhibitors by ozonization or hydrogen peroxide. Oils show a spontaneous increase in the intensity of the 606 $\mu\mu$ band on ageing but this is not at the expense of the 572 $\mu\mu$ chromogen.

II. This second paper deals with the assay of eleven samples of cod-liver oils comparing (a) the biological values obtained by observing resumption of growth in rats on giving the oil after previous depletion of vitamin A reserves on a deficient ration, (b) the " blue values " (Lovibond tintometer) obtained by the action of antimony trichloride on the oil itself and on the unsaponifiable fraction of the oil, (c) the intensity of absorption at 572 $\mu\mu$ and 606 $\mu\mu$ of the blue solutions measured spectrophotometrically and (d) the absorption at 328 $\mu\mu$ of the oil itself.

Statistical examination of the results showed considerable discrepancies between the biological and physico-chemical measurements. The Lovibond blue values cannot be relied upon, although the blue values from the unsaponifiable fraction were better and the direct absorption at 328 $\mu\mu$ gave fairly close agreement especially for oils examined within a few months of receipt from the manufacturers. [For veterinary significance of assays of cod-liver oil, see this *Bulletin*. **1.** 252].

III. The third paper deals with the question of the precursor of vitamin A. Experiments are recorded on rats and cats.

Absorption of carotene from the intestinal tract was influenced by the composition of the diet, being nearly complete when the basal ration contained 10 per cent. of fat. Evidence was obtained of the presence of a substance resembling vitamin A in the caecum of rats fed upon a vitamin A deficient ration supplemented with carotene, but no definite evidence could be obtained in regard to conversion of carotene into the vitamin by the action of intestinal bacteria.

Incubation of carotene with liver tissue *in vitro* gave negative results. Administration of large doses of carotene *per os* to cats depleted of vitamin A reserves did not result in the appearance of the vitamin in the liver or blood, in observations extending up to 40 hours.

H. H. GREEN.

McMaster, P. D., Hudack, S., & Rous, P. (1932). **The Relation of Hydrostatic Pressure to the Gradient of Capillary Permeability.**—*J. Exp. Med.* **55.** 203-221. 1 plate. [25 refs.]

The view still prevails that the exchange through the walls of the blood vessels is governed by diffusion, hydrostatic pressure and the osmotic pressure of the blood colloids acting along capillaries which are equally permeable throughout their length. This view still holds in spite of the demonstration that the escape of vital dyes from the blood into the tissues increases progressively along the capillaries of certain organs and is greatest precisely where it should be least if the factors just mentioned above determine the phenomena. The present experiments were undertaken to throw light on the influence of hydrostatic pressure on the gradient of capillary permeability. The method followed has been to modify this pressure markedly (by nerve section and by methods of altering arterial and venous pressure) and then to inject a vital dye devoid of complicating affinities and ascertain whether the changed conditions have altered the gradient of distribution of the dye from the capillaries. Mice and rabbits were used and experiments were carried out on the skin capillaries of the ear and on the capillaries of certain skeletal muscles. As a result of these experiments it appears evident that the gradient of permeability along the capillaries of voluntary muscles and the capillaries and venules of skin exists independently of the hydrostatic conditions, although influenced by them. Its presence cannot be explained by a graded tonic contraction of the capillaries, but the evidence points to local differences in the barrier offered by the vessel wall as responsible for the gradient. These local differences are considered to be due to structural differentiation along the capillary.

W. R. WOOLDRIDGE.

I. Barritt, J., & Rimington, C. (1931). **The Relation between Total Sulphur and Cystine Content of Certain Samples of Rabbit Fur.**—*Biochem. J.* **25.** 1072-1074. [8 refs.]

II. Barritt, J., & King, A. T. (1931). **Note on the Sulphur-free Nature of Medulla in Blackface Wool.**—*Ibid.* 1075-1076. [5 refs.]

III. Bekker, J. G., & King, A. T. (1931). **Sulphur Distribution in the Component Structures of Wool and Porcupine Quills.**—*Ibid.* 1077-1080. 1 fig. [10 refs.]

A group of three papers from the Wool Industries Research Association (Torridon, Leeds), of veterinary interest mainly in relation to wool quality and sheep nutrition.

I. In a previous study from the same laboratory [(1930). *Biochem. J.* **24.** 106.] on the effect of diets supplemented with cystine upon the composition of the keratin of rabbit fur, large seasonal variations were found in the total sulphur content. In the present paper it is shown that practically the whole of the sulphur can be accounted for as cystine, the form in which Rimington [(1929). *Biochem. J.* **23.** 41 and 726.] accounted for almost all the sulphur present in wool and various animal hairs.

II. The authors conclude that the sulphur content of the medulla substance, in the medullated core distinguishing coarser " kempy " types of wool from the fine merino type comprised only of scale and cortex, is practically devoid of sulphur.

III. The authors provide further information on the nature of hirsute fibres by the examination of porcupine quills, morphologically analogous to wool, but with medullary substance more easily separated for analysis.

Sulphur determinations were made on whole quill, cortex and imperfectly separated medulla, and sections of wool and quill were studied by specific staining reactions revealing differences in amino-acid content.

The authors conclude that medulla cells are substantially sulphur-free and that true keratinization, as distinct from general hardening effects occurring in protoplasmic structures, is the result of incorporation of the cystine nucleus.

Assuming that scale, cortex and medulla are all developed from the same primary plasmic material of the basal layer of the epidermis it is held that the cornification process of scale cells involves cystinization without incorporation of tyrosine, that of the cortex involves both cystine and tyrosine, while the hardening of the medulla cells involves a certain degree of cornification associated with some agent other than cystine.

H. H. GREEN.

Evans, R. E. (1931). **Studies of the Sulphur of Pasture Grass.**—*J. Agric. Sci.* **21.** 207-821.

A paper of significance in relation to the cystine requirements of grazing animals, especially sheep, of which the requirements for wool production are presumably high [sulphur content of wool fibre about 3·5 per cent.].

Determinations of organic sulphur carried out at different stages of pasture growth showed a decrease of about a third at the hay stage as compared with weekly or fortnightly cuttings [equivalent to " close grazing "]. The application of heavy dressings of inorganic sulphates to the pasture produced an increase of 8 per cent. in the organic sulphur of the grazing. No correlation was found between protein and organic sulphur ; a fact which suggests that part of the organic sulphur is present in non-protein form. Attempts to isolate cystine from pasture grass showed very little of this amino-acid. Further evidence of the cystine-low character of pasture was obtained by determining the sulphide sulphur liberated on heating with alkali.

Since all the evidence suggested a figure below 0·1 per cent. in the dry matter the authors conclude that there must be some precursor of cystine in grass, converted into cystine in the animal body.

H. H. GREEN.

Hendricks, W. A., & Titus, H. W. (1931). **A Note on Wood and Capstick's Method of calculating the Maintenance Requirements of the Adult Sheep.**—*J. Agric. Sci.* **21.** 726-738. 2 figs., 4 tables. [4 refs.]

A mathematical examination of Wood and Capstick's method [(1926). *J. Agric. Sci.* **16.** 325.] of calculating the maintenance requirements of adult sheep. The authors conclude that this method is not devoid of sources of error and that it would have been more logical to have classified the animals according to condition rather than according to whether they gained or lost weight.

W. R. WOOLDRIDGE.

McGowan, J. P., Cunningham, I. J., & Auchinachie, D. W. (1931). **On the Fundamental Nature of Vitamin D Action.**—*Biochem. J.* **25.** 1295-1303. 1 table. [11 refs.]

Experiments on rabbits poisoned with chloroform and with excessive doses of vitamin D, in which elimination of calcium and phosphorus, presence in blood

and deposition in tissues, are discussed in relation to destruction of lipins and formation of calcium phosphate.

The author considers that the probable mode of action of vitamin D in the cure and prevention of rickets is by the setting free of inorganic phosphate from body lipins. Relative deficiency of inorganic phosphorus is treated as the *causa causans* of rickets, and calcium deficiency as producing osteoporosis not rickets.

[In regard to the relationship between aphosphorosis and bovine rickets and osteomalacia, compare THEILER, A., & GREEN, H. H. (1932). " Aphosphorosis in Ruminants," this *Bulletin*. **2.** 391].

H. H. GREEN.

I. ALLEN, L. A. (1931). **The Mineral Constituents and Citric Acid Content of Milk.**—*J. Dairy Res.* **3.** 1-51. 9 figs., 39 tables. [102 refs.]

II. ZONDEK, S. G., & BANDMANN, M. (1931). Kupfer in Frauenmilch und Kuhmilch. [**Copper in Human and Cow's Milk**].—*Klin. Wschr.* **10.** 1528-1531. 6 tables. [8 refs.]

I. This paper is a summary and review of our present knowledge of the quantities of the various mineral constituents in milk, the extent and causes of their variation and, as far as possible, the partition of each in the various phases (solid or liquid). Citric acid is included in the survey as it exerts an influence in many ways comparable with that of the mineral salts. The experimental data dealing with the partition of the salts between the soluble and insoluble portions of milk are given in detail. The factors causing variations in this partition are reviewed and a special paragraph is devoted to the influence of disease. [This paragraph only emphasizes our ignorance of the influence of disease on the chemical constitution of milk]. The methods of determining the presence of citric acid in milk are described and experimental results reviewed. The author concludes that there is no ground for doubting the presence of citric acid in milk. The balance of calcium, magnesium, phosphate and citrate is shown to be of importance, especially in its effect on coagulation by heat. Milk with a high mineral content is said to have a superior keeping quality owing to the fact that the salts increase the buffering capacity of the fluid.

II. Determinations of the amount of copper present in a number of milks from women and from cows have been made. The copper content appears to be higher in human than in bovine milk. An examination of 70 human milks gave the average copper content as 0·5 to 0·6 mg. copper per litre whilst the average figure for 90 analyses of cows' milk was 0·15 to 0·2 mg. copper per litre. The copper was estimated by the method of WARBURG, which depends on the catalytic effect of this metal on the oxidation of cysteine.

W. R. WOOLDRIDGE.

I. GERNEZ, C., & LESPAGNOL, A. (1931). Recherches sur le calcium rachidien et sur l'équilibre hémo-rachidien du calcium. [**The Calcium of the Spinal Fluid and the Equilibrium between it and that of the Blood**].—*C. R. Soc. Biol. Paris.* **108.** 1260-1262. 1 table.

II. BALLIF, L., & GHERSCOVICI, I. (1932). Le pH du liquide céphalo-rachidien et dosage du potassium rachidien dans le diagnostic des hémorragies méningo-encéphaliques. [**The pH of the Cerebrospinal Fluid and the**

Potassium Content of the Spinal Fluid in the Diagnosis of Cerebral Haemorrhages].—*Ibid.* **109.** 232-233. [2 refs.]

I. In man the amount of calcium in the spinal fluid is practically constant, varying between the values of 49 and 68 mg. per c.c., with an average of 60 mg. Generally speaking this value corresponds to a blood calcium figure between 100 and 110 mg. and the ratio of the two sets of values does not appear to be upset even in such diseases as the nervous form of syphilis, general paralysis, chronic bronchitis and pulmonary congestion, but in chronic rheumatism both values were high, viz. 114 and 132 respectively.

II. The pH of cerebrospinal fluid is normally 0·15 below that of blood, but after spinal haemorrhage the values are the same. A cerebrospinal fluid with a pH above 7·20 is generally one that contains blood, and so the discovery of a high pH value for the fluid may be used in the diagnosis of a cerebral haemorrhage. It is also found that the potassium content of cerebrospinal fluid is raised from about 0·10-0·18 mg. per c.c. to 1·16-1·48 mg. in the case of cerebral haemorrhage. This is probably due to the haemolysis of red cells in the fluid, following on meningeal haemorrhage. It is possible to get an increase in potassium in the cerebral fluid as the result of *post-mortem* diffusion.

W. R. WOOLDRIDGE.

TECHNIQUE.

LUDFORD, R. J. (1931). **The Vital Staining of Normal and Malignant Cells. IV. A Comparison of the Vital Staining of the Parenchyma Cells of the Liver with Acid and Basic Dyes.**—*Proc. Roy. Soc. Ser. B.* **108.** 270-278. 3 figs. (pseudoscopic). [5 refs.]

The view has been advanced that while vital staining with acid dyes results in the production of new cytoplasmic formations, basic dyes stain pre-existing granules and vacuoles in the cytoplasm. In a previous paper the author discussed the various theories of vital staining with basic dyes and showed that in the case of the pancreas a similar process of segregation does occur as with acid dyes.

The experiments described in this paper were carried out with parenchyma cells of the liver, which are stainable intra-vitally with both acid and basic dyes. It is evident that the same principles of vital staining apply to cells of widely different functional activity.

Both acid and basic dyes are capable of inducing the formation of coloured droplets in the parenchyma cells of the liver. The chief distinction is the longer time taken to produce a granular staining with an acid dye such as trypan blue, as compared with a basic dye such as neutral red.

The droplets are new cytoplasmic formations and are arranged around the margins of the cells bordering the intercellular bile capillaries. The dye stuff which is segregated to form these droplets follows the normal path of excretion in the cell and the process is dependent on the state of functional activity. The capacity of a dyestuff to induce the formation of droplets in the cell is dependent upon certain physico-chemical properties. The rate of diffusion determines the accessibility of the dyestuff to the cell and the formation of the droplets to the extent by which it forms colloidal aggregates. [Pseudoscopic examination involves the use of a stereoscope and duplicated prints of uneven intensity].

J. R. M. INNES.

MISCELLANEOUS.

I. Späh, K. (1931). Die Gefahren der Motorisierung in den Untertagebetrieben der Zechen und ihre Beseitigung durch die Verwendung von Grubenpferden. [**The Dangers of Mechanization in Mines and their Prevention by the Use of Pit Ponies**].—*Münch. tierärztl. Wschr.* **82.** 306-307.

II. Bischofswerder. (1931). Das Leben des Grubenpferdes und seine Krankheiten. [**The Life of the Pit Pony and its Diseases**].—*Berl. tierärztl. Wschr.* **47.** 698-699.

III. Edwards, G. V. J. (1931). **Care and Management of Colliery Horses.**—*Vet. Rec.* **11.** 1069-1072. 1 fig.

I. The author draws attention to recent catastrophies in mines and blames the use of machinery utilizing inflammable fuel or electric current. He touches on some statistics showing the number of horses or ponies in use in German mines giving a comparison of working costs as between horses and machinery and makes a plea for the increased employment of horses.

II. This is a popular lecture delivered as a wireless broadcast dealing with the life of pit ponies and horses.

III. This interesting essay describes the way in which colliery horses are managed (from experience of conditions in the South Wales collieries), their care and feeding, the test for glanders and the construction of underground stables.

J. E.

Beller, K. (1932). Die hygienische Bedeutung des maschinellen Putzens nach Versuchen an Pferd und Rind. [**The Hygienic Importance of Machine-Cleaning of Horses and Cattle used for Experiments**].—*Zschr. Hyg. u. Infektkr.* **36.** 133-140. 4 figs., 2 tables. [8 refs.]

Experiments are described regarding the mechanical cleaning of the larger experimental animals (horses and cattle) by vacuum cleaner (Electrolux), but it is concluded that neither a saving of time nor of labour is effected, while on the other hand a not inconsiderable increase in cost, depending on the consumption of current and the gradual wear and tear of the apparatus, is involved. Against this expenditure, however, can be placed certain hygienic advantages which make the use of vacuum cleaners desirable in infected stables, especially where there are animals affected with infectious and parasitic diseases communicable to man. The possibility of a diminution of the number of germs in the milk of cows which have been cleaned with a vacuum cleaner is left open.

F. BULLOCK.

——. (1932). República Española. Dirección general de Ganadería e Industrias Pecuarias. [**A General Directorate for Zootechnical and Veterinary Services in Spain**].—pp. 142. Madrid : Espasa-Calpe, S.A. [4vo.]

This is a special publication of the Spanish National Veterinary Association and describes in considerable detail the new state of affairs in the Spanish Republic with regard to the livestock industry and the veterinary profession. There has been a complete reorganization and an entirely fresh outlook in these fields is opened up.

The introduction is printed in Spanish, French, English and German and the main subject matter in Spanish and French only.

The introduction makes it clear that the government has realized that animal husbandry and its public health aspect should be controlled by veterinarians.

The new legal enactments are introduced. They order that all services connected with animal husbandry, with the sole exception of that part under the control of military veterinary officers, are to be grouped under a General Directorate of Livestock under the Minister of Economy. The service is to be divided into three sections :—(1) Veterinary Instruction and Social Work ; (2) Livestock Economy and (3) Research and Hygiene relating to Animal Health : a Veterinary Inspector General will direct each section.

Veterinary Instruction.—Two qualifications are granted. A five year course of study is laid down for the diploma and can be taken at the Madrid, León, Saragossa or Córdova veterinary colleges which are adjacent to large stock raising areas, abattoirs, etc. There is provision for both pre- and post-graduate specialization in extra available voluntary courses.

The syllabus of the course is given and, all round, seems to be comparable to the average course in other European countries, but it goes further in that greater attention is paid to animal management and dietetics. Instruction in the German language is given throughout the course. Each year's study consists of two terms, a winter one of five months and a summer one of four months respectively.

For the degree " Ingeniero Pecuario " an extra year's study is taken involving some experimental research. After 1934, the possession of the degree will be compulsory for all important veterinary appointments.

Social Work.—A special department for the purpose of instructing the populace in elementary animal hygiene is established. It also takes an active part in improving the conditions of animal husbandry by advising as to the lay-out of farms, best use of land, etc.

Livestock Economy and Research.—This section is concerned with everything related to the improvement of livestock of all kinds, including research into finding the best breeds for different localities and research into dietetics. It also controls the use of animal products of all kinds. For these purposes a number (not yet fixed) of regional stations is to be established throughout the country. Breeding studs are to be developed extensively and provision for proper breeding records (stud books) is to be made. Agricultural shows are to be instituted as part of the plan to stimulate interest among animal owners.

Other details considered include a statistical bureau for livestock, the transportation of live stock, and fairs and cattle markets.

Special attention is paid to horse breeding and remount depôts.

Hygiene and Animal Health.—This section is to operate by means of three bureaux, whose business it is to prevent and control contagious animal diseases, to regulate trade in livestock and their products and to regulate and inspect abattoirs and shops dealing in food of animal origin.

A final section of this publication outlines the duties of the veterinary officers who are to form the staffs of these many branches of the veterinary organization.

J. E.

——. (1931). Assemblée générale de la Société des Vétérinaires suisses à Sion, les 22 et 23 août 1931. [**Annual General Meeting of the Swiss Veterinary Society, Sion, 22nd and 23rd Aug. 1931**].—*Schweiz. Arch. Tierhlk.* **73.** 610-618.

Reports were presented on the work of the year. The society numbers over

650 members: several committees are at work on subjects such as obtaining employment for members, zootechny (a course of instruction in pig-breeding has been organized, the best method of slaughter of small animals, etc. The society publishes the *Archiv.*

OFFICIAL REPORTS.

SOUTHERN RHODESIA. (1931). **Report of the Director of Veterinary Research for the Year 1930.** [BEVAN, Ll. E. W.] pp. 13. Salisbury: Government Printer. [fcp.]

ROUTINE WORK.—This covers the same ground as before; diagnostical work was carried out and the preparation of immunizing agents against blackleg, redwater, gall sickness, horse sickness, infectious abortion and bovine ophthalmia was continued.

RESEARCH.

Some improvement in the animal accommodation was made and valuable information was obtained from the special work performed.

TRYPANOSOMIASIS.—As about one tenth of the total area of Southern Rhodesia is unsuitable for stock rearing owing to the presence of tsetse fly, the problem of the prevention of trypanosomiasis is a pressing one and among other ways Bevan has approached it from the chemotherapeutical angle. Antimony therapy has been found efficacious in preventing trypanosome invasion when applied in the early stage, but as it is impossible to treat animals at the correct time in mass, an attempt was made to infect a number of cattle deliberately and to apply the drug after the correct interval. Numerous and various difficulties cropped up and success has not yet been achieved. This technique only protects cattle against the trypanosome strain used for the artificial infection.

Work on the complement fixation test for the diagnosis of *T. congolense* infection was performed, but the results were unfavourable.

REDWATER AND GALL SICKNESS.—A general account of the factors involved in immunizing cattle against piroplasmosis and anaplasmosis is given. During the year 18 bulls were imported from England, immunized against these diseases by inoculation with the blood of carriers and sold to stock owners. Tick eradication is of paramount importance.

SHEEP DISEASES.—During the year, the Assistant Veterinary Research Officer, [LAWRENCE, D. A.] made a tour of Southern Rhodesia, examining existing flocks of sheep. He found that parasitism, chiefly helminthic, is very severe and constitutes a large obstacle to successful sheep farming. A list of 17 internal parasites found in sheep is given in the report. Two lots of 50 sheep, both in bad condition through parasitism, were kept under observation, fed on various rations and dosed with a carbon tetrachloride-tetrachlorethylene mixture: the lesson learnt from this was that anthelmintic drugs are often lethal to emaciated sheep, that such sheep untreated by drugs, have considerable powers of recovery when well fed, particularly on fresh grass, and that they are very tolerant to a heavy infestation when in good condition.

VERMINOSIS.—This section contains notes on *Haemonchus contortus*, *Oesophagostomum radiatum* and coccidia in cattle and on *Schistosoma mattheei* and *Trichostrongylus instabilis* in sheep.

MYIASIS.—" Screw worm disease " of cattle is common and is caused by the larvae of *Chrysomyia bezziana*, which invade wounds and cause large lesions. This disease was studied, the bacteria of the lesions examined and a vaccine prepared from them. This had strong curative properties and when applied to

lesions caused the fly larvae to fall out. The vaccine has been supplied to stock owners and good reports were obtained.

OTHER DISEASES.—Sweating sickness of calves became more prevalent, but its nature is not yet known. Contagious bovine abortion and granular vaginitis in cows are common and both are often present in the same animal. Research on these diseases is very desirable.

The report concludes with the following table of infectious animal diseases (a) now existent ; (b) probably existent, but not diagnosed ; (c) which have been eradicated and (d) which may return unless strongly guarded against. This is a valuable and handy index of conditions in Southern Rhodesia.

	Diseases now Existing.	Diseases probably Existing but not Diagnosed.	Diseases which have Existed and been Eradicated.	Diseases which may Appear and which must be Guarded Against.
A. Diseases caused by Bacteria.	Anthrax. Contagious Abortion. Contagious Granular Vaginitis. Calf Diphtheria and Footrot. Dysenteria Neonatorum (*Bloed pens*). Johne's Disease. Quarter-evil. Strangles. Tetanus. Tuberculosis.	Calf Paratyphoid. Malignant Oedema. Pseudo-tuberculosis (*Preisz-Nocard bacillus*). Pyosepticaemia Neonatorum (Joint and navel ill).	Glanders. Lymphangitis— (a) Epizootic. (b) Ulcerative. Morbus Maculosus (*Purpura haemorrhagica*).	Includes all those mentioned under the previous headings, plus :— Contagious Abortion. (a) Equine. (b) Ovine. Haemorrhagic Septicaemia Group of Diseases, including Fowl Cholera. Laikipia Lung Disease of Sheep. Lamziekte. Malignant Catarrhal Fever. Swine Erysipelas.
B. Diseases caused by Protozoa.	Anaplasmosis (Gall-sickness)— (a) *An. centrale.* (b) *An. marginale.* Coccidiosis. Gonderiosis (Mild gall-sickness)— (a) Gonderia (Theileria) mutans Piroplasmosis— (a) Bovine Redwater. (b) Canine Biliary Fever. (c) Equine Biliary Fever. Sarcosporidiosis. Spirochaetosis. *Theileriasis*— (a) East Coast Fever. Trypanosomiasis— (a) *T. brucei.* (b) *T. congolense.* (c) *T. theileri.* (d) *T. vivax.*		Piroplasmosis of Pigs.	Theileriasis— (a) *Th. annulata.* (b) *Th. dispar.* Trypanosomiasis— (a) *T. equiperdum* (Dourine). (b) *T. evansi* (Surra).
C. Diseases caused by Ultravisible Virus.	Blue Tongue. Distemper. Ephemeral Fever (3 days' sickness). Heartwater. Horse-sickness. Snotsiekte.		Contagious Pleuro-pneumonia. Foot and Mouth Disease. Rabies. Rinderpest. Swine Fever (Hog cholera).	Fowl Plague. Influenza of Horses— (a) Pink Eye. (b) Influenza Pectoralis. Variola Group— (a) Pox.
D. Diseases of Obscure Etiology.	Ophthalmia. Sweating Sickness.	Canine Typhus.		
E. Diseases due to Parasites.	External Parasitism. Internal Parasitism. Myiasis (Bovine and canine).			
F. Diseases due to Poisons.	Mineral Poisoning. Vegetable Poisoning.			

J. F.

SUDAN GOVERNMENT. (1931). **Annual Report of the Sudan Veterinary Service 1930.** [KENNEDY, W.] pp. 53. Khartoum: Government Printer. [fcp.]

The report is divided into four sections relating to diseases of animals, trade in livestock and livestock products, improvement of livestock and miscellaneous items. The report of the Veterinary Research Officer [BENNETT, S. C. J.] is given as an appendix, but is dealt with separately in this *Bulletin* [see p. 683].

STAFF.—The staff arrangements were the same as for the previous year with the exception that Mr. EVANS was appointed Assistant Veterinary Research Officer as from 29th October and that three additional veterinary inspectors were appointed.

Consequent on a decision to abolish the Military Veterinary Department of the Sudan Defence Force, the Civil Veterinary establishment was increased by three Veterinary Inspectors and the veterinary care of all military animals devolved on the Sudan Veterinary Service with effect from 31st December.

Several tribal retainers selected by the Chiefs of the cattle-owning tribes have undergone a course of training in veterinary work as proposed last year, In addition to training these men to detect outbreaks of disease in the early stages. to take the necessary steps to prevent the spread of disease and to administer serum and vaccine as required, it is intended to instruct them in such subjects as castration of animals considered unsuitable for breeding purposes, the flaying and preparation of hides and skins for market and the preparation of samn (clarified butter).

DISEASES OF CATTLE.

RINDERPEST.—Rinderpest was widespread during the year throughout the Central Sudan and caused heavy losses, of which nearly 70 per cent. were recorded in the Provinces of Kordofan and Darfur. Export trade from Kordofan was therefore seriously interfered with.

The disease was introduced into Dongola Province in November and December by cattle brought from Kordofan and Khartoum Provinces for slaughter. The natives, however, promptly reported it and the province authorities were thereby enabled to adopt effective measures for its control before it gained a firm foothold.

Reports from the veterinary inspectors of several provinces emphasized the necessity for the provision of adequate serum supplies as there were such serious shortages this year. The question is dealt with at length in the report of the Veterinary Research Officer. The shortage was due to the insufficiency of research staff and laboratory accommodation which had been emphasized in previous reports. Over 15,000 deaths from rinderpest were reported during the year and these do not cover all the deaths as in the Kordofan Province the disease was so widespread that at one time it was impossible to deal with all the outbreaks. Over 60,000 cattle were inoculated during the year.

Towards the end of last year the buffalo in the Opari-Kajo Kaji district of Mongalla Province were reported to be dying of rinderpest and, in January of this year, the disease appeared among buffalo in the Latuka district. An outbreak occurred among cattle in March in the township of Mongalla, causing a mortality of approximately 50 per cent. in herds totalling over 800 head. Later in the year further outbreaks were reported at Juba and in the Terrekeka and Uffude areas. It was considered probable by the province authorities that infection was originally introduced from Uganda by game.

CONTAGIOUS BOVINE PLEURO-PNEUMONIA.—This disease was less prevalent than in the previous year and the total mortality recorded was 494 in 57 outbreaks. 15,700 doses of culture vaccine were used. Improvements in the vaccine are dealt with in the report of the Veterinary Research Officer.

Other Diseases.—There were no outbreaks of foot and mouth disease and only one case of anthrax was reported. Deaths from trypanosomiasis occurred in Gedaref township and in Western Genels district. *Glossina palpalis* and *G. morsitans* were caught in the Fung Province, an area in which their presence had not previously been recorded. Two young Ayrshire bulls imported from Scotland died from theileriasis within a few weeks of arrival.

Diseases of Camels.

Naganol is used for the standard treatment of camel trypanosomiasis and the mercuric chloride test is adopted as the routine method of diagnosis. It was found that donkeys may act as reservoirs of the local camel trypanosome, so donkeys in close contact with camels in the units dealt with are now treated with naganol.

Diseases of Equines.

The mortality from African horse sickness was the smallest recorded for many years ; this is attributed to the moderate rainfall in the affected areas.

Epizootic lymphangitis was diagnosed in material from 17 horses, 32 mules and 15 donkeys. Reference is made to the primary pneumonia due to *Cryptococcus farciminosus* described by Bennett.

Diseases of Sheep and Goats.

Heartwater is reported to have caused fairly heavy losses in a flock of sheep on the Gezira Research Farm, Blue Nile Province.

Diseases of Dogs.

Rabies was prevalent. The Rabies Ordinance, 1930, was promulgated and the existing one was repealed.

Trade in Live Stock and Live Stock Products.

9,520 cattle and 5,702 sheep were exported, the lowest numbers for 20 years.

Permits were issued for the exportation of 6,309 camels, a big drop from the trade of previous years.

The trade in hides and skins showed a decrease. Details are given of internal trade in meat supplies and livestock.

The work of the department on the improvement of livestock is described. These activities cover cattle, horses, camels, donkeys, mules, sheep and poultry.

W. A. P.

Sudan Government. (1931). **Annual Report of the Veterinary Research Officer, Sudan Government, 1930.** [Bennett, S. C. J.] *Ann. Rep. Sudan Vet. Serv. 1930.* pp. 28-53. [fcp.]

This forms an appendix to the Annual Report of the Veterinary Service. It contains reports of the research work on contagious bovine pleuro-pneumonia, trypanosomiasis and epizootic lymphangitis which will each be dealt with separately in this *Bulletin*.

Staff and Accommodation.—There are only two officers on the research staff. The routine work is so heavy that little time is available for research work. Mr. Bennett lays great emphasis on this in his report. It has been necessary to lend an officer from the field staff to cope with the heavy work of the large scale serum production.

The research laboratory is at Khartoum, but the rinderpest serum is prepared at Malakal ; hitherto the accommodation at Malakal has been limited to temporary grass huts, but sanction has now been obtained for new buildings.

ROUTINE WORK.

EXAMINATION OF SPECIMENS.—*Trypanosoma brucei* was diagnosed in two horses, a mule and two donkeys ; *T. congolense* in a horse, a bovine and a dog ; *Piroplasma caballi* in three and *Nuttallia equi* in five horses ; *Theileria annulatum* in recently imported bulls. Other diagnoses covered theileriasis, epizootic lymphangitis, anthrax, pyogenic infections, avian spirochaetosis, scabies and parasitic infestation.

" No attempt is made to classify the other cases of Theileria infection. It is frequently observed in the laboratory that indigenous cattle infected with cattle plague, inoculation contagious pleuro-pneumonia and other conditions, shew *Theileria* in the circulating blood. It seems that the local cattle are naturally premunised against local parasites and tolerate them perfectly. To imported European cattle, however, at least one species of *Theileria* constitutes a very severe menace.

" The first diagnosis of *Actinomyces farcinicus* infection in the Sudan was reported in 1929. This year two more cases have been diagnosed, one at Kosti and one at El Obeid."

The naked eye appearances or location of suppurating sores are of very little help in the diagnosis of equine epizootic lymphangitis. Some description of five unexpectedly positive cases is given in support of this statement.

CONTROL OF CAMEL TRYPANOSOMIASIS.—The mercuric chloride test has now been adopted as the approved routine method of diagnosis.

" The routine method of treatment still consists in the intravenous administration of a single dose of ten grammes of Naganol (Bayer 205). As has already been recorded, it is known that this is an unnecessarily large dose in many cases, but it has been provisionally retained as it has proved itself to constitute an absolute cure as a single dose. Experiments have, however, been started, with the co-operation of certain Veterinary Inspectors, to test the efficacy of smaller doses in camels that can be kept under sufficiently close personal observation after treatment to afford adequately checked results.

" One additional operation has been incorporated in the routine method of control, namely, to inject all donkeys in close contact with a camel unit with one gramme of Naganol. The evidence on which this decision was made is set out in the section on research."

RINDERPEST.—The production of rinderpest serum has been the largest of the routine duties during the year. The disease was widespread during the year and the supplies were inadequate. 2,840 litres of serum were prepared and, owing to the urgent demand, a good proportion had to be made at Khartoum as well as at Malakal. The need for a sufficient stock of serum to meet maximum and not average annual requirements is pointed out.

CONTAGIOUS BOVINE PLEURO-PNEUMONIA.—The vaccine used consists of an attenuated live virus culture given in a single dose. As far as possible the " youngest safe subculture " is used, but at one period, owing to inability to obtain material for the isolation of new virus cultures, vaccine was issued which was prepared from the 30th generation of subculture.

Plans had been made to carry out further investigations concerning the " youngest safe subculture," but with the heavy demands of the routine work this was not possible.

" The number of deaths that could be attributed to the injection of the vaccine was thus 1·08 per thousand. It is not at present possible to discuss this mortality to advantage ; it may, however, be to some degree appreciated by considering the following circumstances :

" 1. In order to ensure that immunity is developed as soon as possible after vaccination the policy is adopted of issuing the 'youngest safe subculture ' as vaccine (see this Report 1927).

" 2. Although the above procedure is accepted as a principle it has not yet been possible to investigate it thoroughly in the laboratory, owing to one's energies having been forced in other directions. By keeping records of the age of all subcultures issued to the field it has, however, been possible to accumulate a considerable amount of evidence on this point.

" 3. During the past three years, admitting that the policy has been to approach the danger line as closely as possible, the deaths that have been reported as directly attributable

to vaccination have been of the order of one per thousand. The actual figures are :—

Year.	Doses.	Abnormal Swellings.	Deaths.
1928	17,590	21	11
1929	28,170	120	29
1930	15,700	51	17

representing an average mortality of 0·92 per thousand.

" 4. Without for the present intending to discuss details, it may be recorded that the accidents and deaths as the result of vaccination have not hitherto been always referable to the younger subcultures."

RESEARCH.—This section of the report consists of the articles on contagious bovine pleuro-pneumonia, trypanosomiasis and epizootic lymphangitis which will be dealt with separately in this *Bulletin*.

W. A. P.

UGANDA PROTECTORATE. (1932). **Annual Report of the Veterinary Department for the Year ended 31st December, 1931.** [POULTON, W. F.] pp. 23. Entebbe : Government Printer. [fcp.]

STAFF.—The staff arrangements were practically the same as for the previous year except that Mr. METTAM had taken up his appointment as Veterinary Pathologist ; his report to the Director of Veterinary Services is dealt with separately in this *Bulletin* [see p. 687].

DISEASES OF CATTLE.

RINDERPEST.—A detailed account is given of the occurrence of rinderpest in nine of the 18 districts in the Protectorate. On the whole, eradication amongst stock was effected before serious spread and marked mortality resulted.

Certain small initial outbreaks were satisfactorily stamped out, 22 being eradicated and only 2 remaining at the end of the year. 39,000 cattle were inoculated. There was satisfactory progress in the control of the disease since the previous year [see this *Bulletin*. **1.** 257]. The total loss of cattle caused by rinderpest in the Protectorate did not exceed 7,000 (including inoculation mortality), a decrease of 18,000 on the previous year's figure.

An outbreak was reported from south central Ankole in January, but on the cattle immediately involved, some 18,000 head, being evacuated northwards to an " immune " area (the result of operations in the previous year) and there inoculated, the disease was eradicated in February and the district remained free throughout the year.

Infection from game is a very serious problem. Buffalo and pig were infected in south Toro. Game pits were dug and renewed to break the continuity of contact between the Lake George herds and those on the eastern shores of Lake Edward. By these means, spread to Kigezi and Ankole was prevented.

Serum-virus inoculation could only be adopted as a last resource in the Toro district owing to the prevalence of *T. vivax* and *T. congolense* infection. Satisfactory cattle camps could not be arranged because, owing to the density of *Stomoxys calcitrans*, trypanosomiasis would have spread rapidly.

An outbreak at Bombo was dealt with by means of strict intensive quarantine and slaughter of the infected herds, a procedure that has seldom been resorted to in Uganda. The results obtained, however, justified the measures : an outbreak in the area shortly after the war had attained serious proportions as the local conditions favour rapid spread ; the outbreaks this year was rapidly suppressed.

As in 1930, the serum supply was partly obtained from the Kabete Laboratory, Kenya, and partly from field serum prepared locally.

TRYPANOSOMIASIS.—Outbreaks of infection with *T. vivax*, *T. brucei* and

T. congolense alone and mixed were reported. On the whole, they did not occasion serious loss. The value of segregation of infected animals in non-tsetse areas is becoming more fully appreciated by the native owners as a means of preventing spread.

CONTAGIOUS BOVINE PLEURO-PNEUMONIA.—No outbreaks of this disease were recorded during the year and it is regarded as having been eradicated except, probably, in Karamoja.

BLACKQUARTER.—Although the disease was reported from all parts of the Protectorate, it is not the cause of serious losses.

ANTHRAX.—The measures instigated in 1930 proved successful in preventing a serious epizootic in northern Masaka district during 1931 and, although isolated outbreaks were reported, no serious mortality occurred. Outbreaks in Ankole were confused with rinderpest by the Bahima, but after a short period the anti-anthrax instructions were obeyed.

Vaccination in this country appears to be more valuable as an annual measure for prevention of the disease than for the control of an existing outbreak.

" A great difficulty in dealing with anthrax in Ankole is lack of firewood to burn carcasses, and cattle owners, being semi-nomadic pastorals, have no implements for digging pits in which to bury their animals."

TUBERCULOSIS.—Tuberculous carcasses are often found at Kampala abattoir in cattle from Ankole.

DISEASES OF OTHER ANIMALS.

Canine piroplasmosis was encountered in all districts and is enzootic in Uganda.

Contagious pleuro-pneumonia of goats was reported from the Eastern Province. Several outbreaks of fowl typhoid were reported, but the course of many was shortened by the use of vaccine from Kabete Laboratory.

GLOSSINA INVESTIGATIONS.

" During the year reclamation work was begun in the *G. morsitans* infested section of south Ankole.

" This part of the district, over 1,000 square miles in extent, is well supplied with permanent water by the River Ruizi, the Nakivali Lake system and the River Kagera, and its natural pasture is excellent for stock rearing. It is now largely closed to stock owing to *G. morsitans* infestation.

" This work was financed from the Colonial Development Fund on the recommendation of the Tsetse Fly Sub-Committee of the Economic Advisory Council and it was experimental in that it was designed to test a theory that the elimination of *G. morsitans* over a wide area might be accomplished by the clearing of their primary foci alone, as distinct from clearing the entire fly-belt.

" The clearings amounted to approximately twenty three square miles in extent and affected directly areas amounting to approximately eight hundred and fifty square miles.

" The clearings themselves are now fly-free, despite the fact that they were localities selected for clearing as they had been found to record over a period of many years either a constant dense fly infestation or, alternatively, continuation as the principal breeding grounds of the morsitans.

" The extermination of the fly in these centres has not been balanced by an increase elsewhere as the evidence of catches in the uncut areas throughout the year is to the effect that in them the fly has also declined markedly in numerical strength.

" The two original smoke houses have continued to function satisfactorily, and towards the close of the year a third was erected close to the Kakitumba bridge to fumigate traffic entering the Protectorate from the morsitans areas of Belgian Ruanda."

Fly surveys have been made in the West Nile District, principally in connection with cattle routes.

ANIMAL HUSBANDRY.

Castration work was extended and the total number of animals treated exceeds last year's total by 41,500.

The imported poultry (Rhode Island Red, Australorps and Barnevelders) are doing well, but the attempt to hatch sittings of eggs from Great Britain was disappointing.

STOCK FARMS.

A "farm" in Langa, financed from Native Administration Funds, was developed during the year and promises to be highly successful. The establishment at Soroti was moved to a more suitable site.

The ghee industry, the trade in hides and skins and the meat and milk supplies are discussed.

W. A. P.

UGANDA PROTECTORATE. (1932). **Extracts from the Annual Report, 1931, of the Veterinary Pathologist.** [METTAM, R. W. M.] *Ann. Rep. Vet. Dept. 1931.* pp. 16-18. Entebbe : Government Printer. [fcp.] [2s.]

RESEARCH.—This is a preliminary report on the work that was carried out in the first year of the appointment in spite of the fact that neither the laboratory nor the equipment was available for most of the year. In the meantime the organization of the research work for the ensuing year was arranged.

A beginning was made in the classification of collections of ticks and other parasites that had been gathered by the officers of the department. All the office files and also scientific publications have been searched for records of Uganda parasites. An appendix to the report [IA] gaves a full classification of the ticks collected, together with the host names. Appendix IB shows similar details of other parasites.

The Assistant Veterinary Pathologist [CARMICHAEL, J.] spent four months in south Ankole investigating the effect of rinderpest virus on *Glossina morsitans*.

A considerable amount of routine diagnostic work was dealt with, mostly with material from cattle.

Observations on protozoan infections in sheep and waterbuck (*Theileria mutans* type), snakes and lizards (*Haemoproteus* spp.) were made.

Material from "turning sickness" in cattle was collected for later examination (owing to inadequate facilities at the time).

The Veterinary Pathologist now occupies the old veterinary laboratory at Entebbe which had been taken over by the medical department and has since been vacated.

It has been decided that, as no facilities exist at the laboratory for the preparation of serum and vaccine against rinderpest, a rigidly isolated building shall be constructed ; a site has accordingly been selected and £6,000 has been allocated for the purpose.

W. A. P.

NIGERIA. (1931). **Annual Report of the Veterinary Department, Northern Provinces, for the year 1930.** [HENDERSON, W. H.] pp. 46. Lagos : Government Printer. [fcp.]

A large proportion of the cattle owners lead a nomadic life ; difficulties in transport, especially in the wet season, prevent prompt action when outbreaks of disease occur : in consequence the policy of the department is to carry out large scale active immunization while the cattle are healthy in the case of diseases to which the method is applicable, and immunization centres have been set up in suitable localities for this purpose.

Diseases of Cattle.

" Rinderpest.—The situation with regard to this disease has been extremely favourable throughout the year. The outbreaks that did occur were, owing to the large proportion of the cattle of the country that are now immune, almost always confined to individual herds or to very localised areas.

" From the available official returns of deaths from various diseases a total of 22,000 head of cattle is reported by Native Administration officials to have died from rinderpest out of the approximate total of 3,000,000 cattle. Most of these deaths took place in the province of Bornu, where conditions for carrying on anti-rinderpest work are most unfavourable.

" It may safely be assumed that this disease is now well in hand and that it is only necessary to continue and extend the present campaign of immunisation to all parts of Nigeria where there are cattle in order to eradicate the disease ultimately from the country."

The Director estimates that there are 600,000 artificially immunized cattle and that, including those which have passed through outbreaks of the disease, there are altogether two million immune cattle in the country, which is two thirds of the whole cattle population.

During the year, 221,870 cattle were actively immunized, with a mortality of about 3 per cent. All except 6,034, which were inoculated with formolized spleen vaccine, were given virus-serum simultaneous inoculation.

Contagious Bovine Pleuro-Pneumonia.—Owners have been reluctant to report the existence of this disease in their herds, but efforts have been made to control outbreaks by vaccination of healthy cattle. Severe reactions followed the use of the vaccine in two Provinces, due to the varying susceptibility of some cattle to this disease, but later in the year an attenuated vaccine was issued and the results have been very satisfactory. 18,737 animals were inoculated.

Foot and Mouth Disease.—The mortality among adult stock was small, but there was a severe loss of sucking calves in some herds. The infection died out towards the end of the year.

Bovine Trypanosomiasis.—Native owners submitted their animals for treatment in large numbers, realizing its value. Mortality among animals inoculated against rinderpest was high if they were chronically affected with trypanosomiasis. The report emphasizes the importance of continued efforts to eradicate the tsetse fly and of arrangements for an adequate supply of drinking water in the arid areas as this would prevent the cattle from moving to the banks of the rivers which are infested with the fly. Natives have been trained to perform intravenous injections for the treatment of trypanosomiasis and others are receiving instruction.

Anaplasmosis.—" The presence of this disease among the cattle of Nigeria has not, so far, been detected in spite of a very close search having been made."

Piroplasmosis (*Theileria mutans* and *Babesia bigemina*).—The existence of these infections as a concomitant of rinderpest has already been recorded. It is considered that chronic infection with these parasites accounts for the unthriftiness through which most calves seem to pass.

Blackquarter.—This disease has been kept well under control as a result of the establishment of immunization centres. A table is given showing the number of cattle vaccinated. Blackquarter vaccination was often given simultaneously with anti-rinderpest inoculation. 246,265 animals were inoculated.

Haemorrhagic Septicaemia.—There have been sporadic outbreaks of this disease, but the mortality was never serious.

Tuberculosis.—The occurrence of the disease was reported during the previous year; it has now passed to the province of Adamawa and has been noticed on the Stock Farm. The herd is being tested with tuberculin.

Diseases of Equines.

" There is nothing of particular note to record under this section as, apart

from the presence of trypanosomiasis, Nigeria may be considered a country healthy for horses."

Diseases of Sheep and Goats.

Contagious Pleuro-Pneumonia of Goats.—There is no doubt that this disease causes heavy mortality every year, but owing to shortage of research officers, it has not been possible to make the necessary investigations.

Skin Diseases of Goats and Sheep.—It is considered necessary that further investigations be made as 20 per cent. of Nigerian goat skins show lesions of skin disease.

Sarcoptic Mange.—This disease appeared among the long-woolled sheep on the Stock Farm, but did not spread to the indigenous sheep.

Diseases of Dogs.

Rabies occurs to a serious extent. Pagan-owned dogs are not controlled. The question of immunizing European-owned dogs is under investigation.

Diseases of Fowls.

Fowl typhoid was prevalent and caused a high mortality. Treatment by vaccination was most successful and efforts are being made to let owners of birds know that mortality can be reduced by the aid of vaccination.

Stock Farm.

A list is given of the animals on the Stock Farm and of the work done there.

Drying of Skins.

Native inspectors have been trained to superintend the flaying and drying of skins and very satisfactory reports have been received both from Nigerian and English buyers on the improvement in the quality of the skins and hides. The Kano Native Administration has made the shade drying of all skins compulsory.

Co-operation with the French.

Attempts have been made to co-operate with the Veterinary Service of the adjacent territories, with a view to facilitating the work of eradicating the serious local epizootic diseases by making simultaneous efforts on both sides of the borders.

W. A. P.

Nigeria. (1931). **Report of the Veterinary Pathologist for 1930.** [Hall, G. N.] *Ann. Rep. Vet. Dept. N. Prov. 1930.* pp. 20-46. Lagos: Government Printer. [fcp.]

The building programme commenced in 1927 is now completed. Malaria and dysentery are endemic in both the European and native staff.

The report includes special articles on rinderpest and contagious bovine pleuro-pneumonia which will be dealt with separately in this *Bulletin*. The work is therefore not given in detail here.

Routine.—The routine work of the production of rinderpest serum, blackquarter vaccine and pleuro-pneumonia vaccine occupied a considerable time of the laboratory staff. 250,000 doses of anti-rinderpest serum and 400,000 doses of blackquarter vaccine were produced during the year. Much research work into contagious pleuro-pneumonia, blackquarter, rinderpest and other diseases of native cattle was also undertaken.

Blackquarter.—Work was done on the dose of vaccine required, the interval required for the development of immunity after vaccination (interval found to be

as short as from two to three days), the duration of immunity after vaccination (duration up to six months in tests carried out), the value of vaccine after storage for different periods and the value of natural aggressin for the purpose of immunization.

Tuberculosis in cattle exists in Southern Nigeria, but only one case has been found in the Northern Province. Human tuberculosis is, however, prevalent.

Coccidiosis has been studied and reported on by HALL and THOMPSON [(1931). *J. Trop. Med.* **34.** 369].

It is not yet known whether heartwater exists in Nigeria or not. Work on the subject is in progress.

Babesia motasi was diagnosed in a ram imported from French territory a year previously.

Plant poisoning and fowl diseases are discussed.

W. A. P.

BASUTOLAND. (1931). **Annual Report of the Principal Veterinary Officer for the Year 1930.** [VERNEY, F. A.] pp. 9. Maseru. [Typescript].

The worst draught of recent years occurred during the period under review and caused much loss in livestock, as well as interfering greatly with the scab eradication campaign. The outlook appeared very hopeful at the end of the year, by which time the full number of 201 dipping tanks necessary for the whole territory was completed ; the conditions with regard to equine mange are favourable.

For reasons of financial economy it was decided to omit goats from dipping during the year, as it was believed that they do not act as carriers of the sheep scab mite. As goats represent over 30 per cent. of small stock the saving was considerable.

Thirty-three outbreaks of anthrax occurred and 52,126 animals were inoculated with anthrax vaccine obtained from the veterinary department of the Union of South Africa. The results were very good.

The apathy of the native Basutos militates against schemes for the improvement of livestock. Unless great progress is made the wool industry must suffer very considerably. Improvement in quality is necessary if good prices are to be obtained.

J. E.

I. GAMBIA, COLONY OF THE. (1931). **The Annual Report of the Department of Agriculture for the year ended March 31st, 1931.** [BROOKS, A. J.] pp. 51. London : Crown Agents for the Colonies. [fcp.] [5s.]

II. GAMBIA, COLONY OF THE. (1932). **The Annual Report of the Department of Agriculture for the year ended March 31st, 1932.** [BROOKS, A. J.] pp. 18. London : Crown Agents for the Colonies. [fcp.] [3s.]

I. This colony still lacks a veterinary officer. The only reference of veterinary interest is to cattle disease [evidently rinderpest] which was reported in several districts.

II. It is stated that rinderpest still kills some 5,000 head of cattle annually. During the year a visit was paid by Mr. R. E. MONTGOMERY, late Veterinary Adviser to the Colonial Office, and he made a survey of the cattle industry and submitted a plan for immunizing cattle against rinderpest. No further details are given.

J. E.

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